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A TWELVE-YEAR STUDY OF DIFFERENTIATED GROUPS OF HIGH-SCHOOL PUPILS

LILLIAN PORTENIER

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Individual differences in mental ability were recognized by the ancients, but few attempts were made to study the problem scientifically before the opening of the Nineteenth Century. The many problems resulting from individual differences in mental ability were greatly intensified as education spread to include all classes of people. In attempting to alleviate these problems, the public schools have introduced innovations of various kinds from time to time, with but little success.

Among the earliest methods attempted and one which proved very popular and far-reaching in its effects was that of retarding inferior pupils while accelerating the superior ones, thus narrowing materially the distribution of mentality in a single grade. Little or no effort was made to adapt the work of the grade to the abilities of the pupils enrolled. Pupils became discouraged and developed a dislike for school work and unfortunate maladjustments resulted.

With the introduction of intelligence tests during the first quarter of the Twentieth Century, the practice of classifying pupils into homogeneous groups on the basis of test results became common. This method proved most practicable in city school systems. The children in each grade were divided into three, five, or even more groups ranging from the very inferior to the very superior. Among the first city systems to use this method extensively was that of Lincoln, Nebraska. The method was tried out first in the elementary grades and gradually came into common use in both the junior and the senior high schools. By the fall of 1923, the practice was fairly well established in the high schools, and marked improvement had been made in the basis of selecting pupils. Pupils were classified by the high-school principal

and his assistants for the three types of groups—inferior, average, and superior—on the basis of (1) the intelligence quotients resulting from the Terman Group Test of Mentality, (2) the academic achievement as shown by their elementary-school and previous high-school record, and (3) ratings of ability independent of school achievement as judged by teachers with whom they had taken at least one semester of work. Since the resulting groups were seldom homogeneous in any respect, the pupils were designated as "differentiated" rather than as "homogeneous" groups.

In the fall semester 1923–1924 the writer, who was a teacher of mathematics in the high school at Lincoln, Nebraska, was assigned two differentiated groups for an introductory course in algebra. Group *A*, an accelerated group, was composed of thirty pupils, sixteen boys and fourteen girls, who were considered by their classroom teachers and the principal as exceptionally well adjusted* in their school work and were rated as very superior on the basis of the three criteria utilized for classification. Group *B*, a retarded group of twenty-two pupils, twelve boys and ten girls, who, on the basis of teachers' judgments, were some of the most poorly adjusted pupils in their school work were, for the most part, rated very inferior or below average according to the three criteria.

In an attempt to maintain, and increase if possible, the superior adjustment of the pupils in Group *A* and to improve the poor adjustment of the Group *B* pupils a rather intensive case study of each of the fifty-two pupils was undertaken. Data were secured on the mental, educational, physical, and social development which one might reasonably assume were influential factors in producing an exceptional type of adjustment with the hope of discovering factors tending toward success or failure in high-school achievement.

The rating for mental ability was secured from the results of three group intelligence tests. The tests used were the Terman Group Test of Mentality, Form *A*; the Otis Group Intelligence Scale, Form *B*; and the Illinois General Intelligence Scale, II. In cases of marked discrepancy in the results of the three tests the Stanford Revision of the Binet Tests was utilized to determine the mental level of the pupil. The Stanford Achievement Test, Advanced Examination, Form *A*, was used as a basis for judging achievement in the elementary-grade

* The terms "adjusted" and "adjustment" as used throughout this discussion imply, merely, that the individuals were in harmony with a given situation as rated by teachers, principals, employers, or other raters.

work. The mechanical aptitude of each pupil was determined from the results of the Stenquist Mechanical Aptitude Tests.

The scores obtained from each of the foregoing tests were converted into age scores by comparing each score with the norms established for the various tests. It was necessary to extend the norm scales arbitrarily for some of the tests used so as to include extreme cases. The norms used in comparing height and weight were the average height and weight of four thousand five hundred sixty-six boys and girls of the Lincoln schools. These averages are somewhat higher both for height and for weight than for the average boy and girl of corresponding age for the country generally, but for our purpose it seems desirable to compare the two groups studied with a random sampling of Lincoln pupils rather than with unselected groups elsewhere. Further data on the physical condition of the two groups were obtained from the cumulative health record cards resulting from the annual physical examination over a period of years, and from questionnaires to the pupils and parents.

The status of the family and of the social background of all pupils was determined from data secured from the census records, questionnaires to pupils and parents, and visits to the homes. The vocational choices of the pupils also were recorded.

The average pupil in the Lincoln high school was expected to carry from forty to fifty credit hours of work during a school year. A system of weighted credits was used as follows:

Grades	Hours Credit
95 to 100	6.0
90 to 94	5.5
80 to 89	5.0
75 to 79	4.5
70 to 74	4.0
Below 70	0.0

Since a student may stand high in general intelligence as measured by a mental test and be lacking in the habits, attitudes, and interests which are most conducive to successful living, an attempt was made to evaluate these essential characteristics to aid in the individual and group diagnoses of the two classes of pupils. Each pupil was rated by from three to six teachers with whom he had had at least one semester's work. The teachers were not informed of the classification of pupils for this study. The scale used was "A Rating Scale for Individual Capacities, Attitudes and Interests" devised by W. Hardin Hughes.[1]

The technique of "man-to-man" rating suggested in the manual accompanying the scale was followed quite closely. In determining the final rating for a student on any one of the twelve traits an average of the three to six ratings given by the teachers was used. The five points on the scale are designated as highest, superior, medium, inferior, and lowest.

In compiling the data for the comparison of the two groups, the range and the median were determined for most of the distributions. The groups were too small and the distributions too skewed to use the means and the standard deviations as suitable measures for comparison. The results of the data for Groups *A* and *B* are shown in Tables I, and II.

The ranges in height and weight as well as the medians were greater for Group *B* than for Group *A*, but, when the difference in chronological ages of the two groups was considered, Group *A* unquestionably was superior. (Table I.) In appearance the two groups presented a marked contrast. The pupils in Group *A* were quite uniform in size. Their range in height and weight was small. Group *B*, on the contrary, presented some of the most marked extremes in high school for the girls as well as for the boys. The record of contagious diseases listed on the health cards and a study of the attendance records for the past six years indicated a tendency toward more prolonged periods of illness in Group *A* and to more numerous periods of short illnesses attributed to colds and other epidemics in Group *B*. No figures can be given to prove this statement since the completeness of the records seemed to vary and the individual records might not have been comparable.

A greater number of pupils in Group *B* were in need of medical attention for eyes, ears, throat, and teeth. This does not necessarily indicate inferior physical condition. The lower social status of Group *B*, for the most part, might have caused the parents to be less sensitive to the need of medical attention for minor physical ailments. Only one pupil in either of the groups, a dwarf in Group *B*, had any pronounced physical defects.

Group *A* also was very superior to Group *B* in mental age, intelligence quotient, and in educational age, but the difference in mechanical ages was not significant. Group *A* carried a slightly larger number of hours of work and earned several hours more credit, on the average, with a distinctly higher academic average than Group *B*. All pupils in Group *A* were enrolled in the University Preparatory course (Table II), while twenty-five per cent of the boys and twenty per cent of the girls in

Group *B* were enrolled in the General course, and twenty per cent of the girls in the Normal course. All others were enrolled for University Preparatory work.

TABLE I.—RANGES AND MEDIANS FOR THE DATA ON PHYSICAL, MENTAL, AND EDUCATIONAL DEVELOPMENT FOR THE BOYS AND FOR THE GIRLS, GROUP *A* AND GROUP *B*, 1923–1924

		Group *A*		Group *B*	
		Boys	Girls	Boys	Girls
Number		16	14	12	10
Height	Range	4′-10″ to 5′-5″	4′-11″ to 5′-5″	4′-3″ to 6′-2″	5′-0″ to 5′-10″
	Median	5′-2″	5′-2″	5′-8″	5′-3″
Weight	Range	79 to 140	80 to 125	85 to 191	89 to 142
	Median	98	108	133	123
Intelligence quotient	Range	123 to 145	122 to 146	80 to 108	67 to 105
	Median	135	130	93	92
Chronological age*	Range	12–11 to 14–10	12–10 to 14–11	14–9 to 18–10	15–2 to 18–0
	Median	13–8	14–1	17–5	15–10
Mental age	Range	17–8 to 19–4	17–0 to 20–0	13–0 to 15–11	12–0 to 15–6
	Median	18–8	17–11	14–6	14–9
Educational age	Range	16–4 to 18–11	15–9 to 17–10	13–3 to 16–2	11–9 to 15–5
	Median	17–2	17–3	14–1	14–4
Mechanical age	Range	17–0 to 20–0	12–0 to 18–6	13–6 to 20–0	9–6 to 17–6
	Median	19–0	14–6	18–6	15–0
Hours of work carried†	Range	40 to 47	35 to 50	40 to 47	41 to 50
	Median	45	45	43	44
Hours credit earned†	Range	41.5 to 52	38.5 to 53	12.5 to 46	21 to 49
	Median	46.5	48.5	35	42.5
Academic average†	Range	80 to 94	84 to 96	57 to 86	66 to 87
	Median	88.5	91.5	76	77

* The chronological ages are the actual ages of the pupils January 1, 1924. All other ages were corrected to correspond with the chronological ages of this date.

† The data included in these last three items are for the full school year 1923–1924.

An outstanding factor in Group *A* was the ambition for and pride in educational achievement as shown by numerous miscellaneous items of information gathered by the questionnaires and interviews. Seventy-seven per cent of Group *A* and only fourteen per cent of Group *B* had

earned Efficiency Certificates in junior high school for superior personal, economic, civic, or cultural habits and exceptional or original achievements.

TABLE II.—CURRICULA AND VOCATIONAL CHOICES FOR THE BOYS AND FOR THE GIRLS, GROUP *A* AND GROUP *B*, 1923–1924

	Group *A*		Group *B*	
	Boys, number	Girls, number	Boys, number	Girls, number
Curricula:				
University preparatory	16	14	9	6
General	0	0	3	2
Normal	0	0	0	2
Vocations:				
Architect	2	0	1	0
Author	0	1	0	0
Business man	4	0	5	0
Cartoonist	1	0	0	0
Designer	0	1	0	0
Doctor	1	0	0	0
Engineer	4	0	3	0
Farmer	2	0	1	0
Lawyer	2	1	1	0
Musician	0	5	1	0
Teacher	0	6	0	10

All but two pupils in Group *B* had repeated a grade or failed in certain subjects. Two pupils in the group had skipped a grade, but they had previously or later repeated a grade. In Group *A* three pupils found it necessary to repeat a grade largely because of absences due to illness or travel. Five pupils had failed in one course, each, mainly as a result of careless habits; however, all except three of the pupils in this group had skipped from one to two grades in the elementary schools. The retardation of Group *B* may have been due, in part, to absences from school. For the five-year period 1918–1923 Group *B* averaged about fifty per cent more absences than did Group *A*.

The data in Table II show marked need of educational as well as of vocational guidance for high-school freshmen. The general mental ability of several of the pupils as shown by Table I was below the

averages that have been found necessary for successful workers in many of the curricula and vocations chosen.

A comparison of the findings of the two groups resulting from the questionnaire studies, indicated that Group *A* unquestionably was superior to Group *B* in both family and social background. Twenty-seven per cent of the pupils in Group *B* and only seventeen per cent of the pupils in Group *A* came from broken homes. For sixty per cent of Group *A* and for but fourteen per cent of Group *B* one or both parents were university graduates.

No reliable figures were secured from which to estimate the family income, but it seemed safe to conclude from a study of the occupations of the parents that Group *A* had marked advantages, particularly since there were fewer children in most families in Group *A*. With but few exceptions the economic conditions of the homes in Group *A* were such as to offer no handicap to early training and development. In Group *B*, on the other hand, even a public-school education was a financial burden in some cases.

In addition to the information on club membership, reading habits, and movie attendance, the questionnaires to and the interviews with parents and pupils showed that only about ninety per cent of Group *A* and less than fifty per cent of Group *B* had been given private instruction in music, dramatics, or dancing. Group *A* had also enjoyed superior advantages in travel, which is often an invaluable stimulus to further school achievement. The pupils in Group *A* listed many more distinguished relatives on the average than did those in Group *B*, indicating higher artistic and literary culture in many of the homes.

Home life and surroundings, in time, register their effect on the sensitive growing child. It is difficult to estimate the precise value of all of these different items, but that they do have their effect few will question.

The average rating for Group *A* was "medium" or above on all of the twelve traits of the Hughes scale, while the average ratings for Group *B* were "medium" or below on all traits. Group *A* was outstandingly superior to Group *B* in quickness of thought and retentiveness of memory. Other traits in which Group *A* was very superior are sense of accuracy, confidence in own ability, and capacity for group leadership.

Special interests which were checked on the rating scale as superior for several pupils in Group *A* were executive, social, expressive, literary, artistic, and musical. Interests in which some pupils in Group *B* were

checked superior are mechanical, constructive, musical, and athletic interests. Several pupils in Group *B* were rated inferior in literary, scientific and mathematical, and executive interests.

As previously stated the original study was carried on during the school year 1923–1924 while the pupils were enrolled for differentiated courses in first year algebra. These data were compiled and analyzed and the resulting study presented as a master's thesis.[2]

Since most of the pupils were enrolled with the writer again the following year for work in plane geometry, the study was continued. As a result of the intimate contacts thus established and the personal interest aroused, the accumulation of data on the achievement of the pupils in both groups was continued over a period of twelve years. To obviate, as much as possible, the personal factor which is likely to enter into a study of this nature, all of the data were checked and additional information was secured by a graduate student at the University of Nebraska who was trained in the use of the case-study technique and who also had a background of training in psychology in methods of research.*

In the follow-up study an attempt was made to gather as much information as could be obtained concerning the extent, the kind, and quality of education each pupil received. The fields of employment after leaving school and the success of each individual as measured by promotions, remuneration, and ratings of employers and co-workers, when possible to secure adequate ratings, were recorded. Their interests other than vocational were also recorded, and some estimates of the degree of personal and social adjustment were secured.

On the basis of the data obtained the two groups were compared again after twelve years. As shown by Table III the large majority of pupils in both groups completed four years of high-school work, however, the percentage is higher for Group *A* than for Group *B*. The two boys in Group *A* who did not complete their high-school work were unable to do so because of poor financial circumstances in the home, and the girl, largely as a result of poor health. The four boys in Group *B* who completed only two years of high-school work had intelligence quotients below ninety, two below eighty-five, and the averages of their ratings for most of the twelve traits were "inferior" or "lowest."

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* The writer is indebted to Miss Lucille Lampert, a graduate student at the University of Nebraska, 1934–1935, for invaluable assistance in verifying and collecting data.

TABLE III.—EDUCATIONAL AND VOCATIONAL ACHIEVEMENT AS SHOWN BY THE FOLLOW-UP STUDY, 1924–1935

	Group *A*		Group *B*	
	Boys	Girls	Boys	Girls
Number	16	14	12	10
I. Education:				
Two years high school	1	0	4	2
Three years high school	1	1	0	1
Four years high school	14	13	8	7
No years university	2	2	7	4
One year university	0	0	1	1
Two years university	1	1	1	1
Three years university	3	2	0	0
Four years university	5	6	2	4
Five years university	0	0	1	0
Six years university	4	2	0	0
Eight years university	1	1	0	0
II. Honors:				
University graduation "with honor"	4	3	0	0
Number winning honors	6	7	2	1
Number of honors won	11	12	3	2
III. Vocation, 1935:				
Actress	0	1	0	0
Business	3	2	0	0
Clerical worker	4	4	2	1
Clerk	2	0	3	0
Dentist	0	0	1	0
Engineer	1	0	0	0
Housewife	0	1	0	1
In school	2	0	1	0
Lawyer	1	0	0	0
Odd jobs	0	0	1	0
Salesman	1	0	2	0
Teacher	0	2	1	2
Tree surgeon	1	0	0	0
Unemployed	0	2	0	3
No data	1	2	1	3
IV. Average monthly salary*	$130	$130	$142	$100

* The figures for average monthly salary may be misleading. In determining the average salaries only those individuals were included who were gainfully employed. This eliminates all housewives, those in school, the unemployed, and those for whom no data were secured. The figures are based on thirteen boys and nine girls in Group *A* and ten boys and three girls in Group *B*. Since not all were earning fixed monthly salaries, the figures used were nearest approximations.

The two girls in the group who dropped out of high school after two years of work had intelligence quotients of sixty-seven and seventy-eight, respectively, and the one completing only three years had an IQ of eighty-seven. Their ratings, too, were below "medium" on most of the twelve traits. The IQ's of the two boys in the group completing four years, and the one boy completing five years of university work were eighty-four, eighty-eight, and one hundred eight, respectively, and the four girls completing four years of university work had IQ's of eighty-five, ninety-two, one hundred one and one hundred five, respectively. Most of these students were rated above "medium" on regularity and persistency, trustworthiness, and respect for authority, and at least "medium" on strength and control of attention. However, there were three ratings of "inferior" and one of "lowest" on the above traits for the seven students, and several equally low ratings on the other traits which were rated.

The three honors for the boys of Group *B* were won by the two boys with IQ's of eighty-four and one hundred eight, respectively. The former earned a medal for unusual athletic prowess, and the latter won honors in his dental course and in his dental fraternity. The annual salary of these two men for the last two years of the study ranged from thirty-five hundred dollars to five thousand dollars. These salaries were higher than any others earned in either group, but both men are from three to four years older than the men in Group *A*. The two honors won by the girl in Group *B* were in intramural sports and in an honorary music sorority. The twenty-three honors won by Group *A* include five elections to Phi Beta Kappa, two to Sigma Xi, seven "With Honor" graduations, and nine for exceptional achievement in special fields.

Of the nineteen students in Group *A* who completed at least four years of university work, eleven were financed, one earned his way, in part, and seven worked their way entirely. In Group *B* six of the seven students were financed and one earned all of his way through college.

With but few exceptions the vocations in which the young people of both groups were engaged in 1935 were but distantly related or wholly unrelated to their vocational choices as freshmen in 1923. Only two of the ten girls who gave teaching as their choice of vocations were teaching in 1935. No others had taught at any time during the period. Three of the remaining eight girls were doing or had done clerical work, four had clerked in stores, and one had never been gainfully employed.

Two of the five boys who had listed "business man" as their vocational choice were clerking in stores, one was a clerical worker, and one a salesman. In Group *A*, the girl who had ambitions to be an author in 1923 had majored in music throughout her eight years in college, and the one who had achieved distinction as an actress by 1935 gave music as her vocational choice in 1923. One girl who had listed "musician" and one listing "teacher" as high-school freshmen were teaching in 1935. The boys of Group *A* tended to follow their vocational bent as freshmen somewhat more closely. Of the four choosing "business man" two were in business, one was a clerical worker, and one a salesman. One of the four listing "engineer" was engaged in the work and one of the two "lawyers" was practicing law.

It is difficult to make a fair comparison of the two groups as regards vocational success. Many of the vocations in which Group *A* were engaged in 1935 are commonly considered superior to most of those found for Group *B*. However, since the median age for Group *B* was from two to three years older than for Group *A*, and since most of Group *B* did not continue in school for as many years, most of Group *B* had begun their vocational careers and were somewhat established in their work before the depression. Many of the girls as well as boys in Group *A*, on the other hand, were not ready to begin work until about the time of the depression and then found much difficulty in securing employment and were forced, in many cases, to accept positions paying relatively low salaries. These facts may account in part for the higher average monthly salary for the boys of Group *B*. It seems safe to predict that this difference will have disappeared, or may be reversed, after a few more years, since the promise of promotion and increased remuneration appeared to be more hopeful for Group *A* as shown by the ratings of employers. Another decade will undoubtedly show many changes.

There was little difference in the ratings for success secured for those engaged in teaching in the two groups, but most of the clerical workers and clerks in Group *A* were rated somewhat higher by their employers and also had positions offering greater opportunity for advancement than did those in Group *B*.

As regards avocational interests, the activities of Group *A* covered a much broader scope than did those for Group *B*. The people in Group *B*, for the most part, were active in but one limited field, and in small local group activities. Group *B*'s participation in the various organizations was limited largely to membership, while Group *A* was char-

acterized by the large number and the strength of the leaders which it had supplied to several widely scattered communities.

We must take into account the fact that these people are still young—their ages ranging from about twenty-five to twenty-seven and twenty-seven to thirty years in the two respective groups. Undoubtedly, they had not reached the height of their achievement. They may tend to specialize somewhat more with increase in age but most of the young people had already acquired a balanced background. Their thinking is not likely to become narrow. They probably will continue to develop along the lines of the interests shown. The economic situation which continued throughout the last years covered by the study, no doubt had some influence on the outside interests and activities as well as on the vocational status of both groups. As a result of financial pressure some may have found it impossible to engage in many outside activities. Thus, although some had manifested but limited capacity for leadership or for diversified activities during the period studied, more types of ability may find expression in the future.

Some of the foregoing conclusions were based on somewhat subjective evidence, but the data for the present paragraph concerning the degree of personal and social adjustment were wholly lacking in objectivity. Hence, the conclusions drawn may well be questioned. As far as could be determined from the data secured, most of the young people of Group *A* were still very well adjusted to their surroundings. One of the girls who had been unemployed for more than a year appeared to be unduly sensitive and perturbed about it and gave clear evidence of a very anti-social attitude. Of the nineteen persons in Group *B* for whom fairly adequate data were secured, four still seemed to be poorly adjusted in their vocational and social life, eight had attained about an average degree of adjustment, and seven manifested several signs of superior adjustment. On the basis of the data secured, most of Group *B* seemed to be about as well adjusted vocationally, socially, and personally in their respective environments in 1935 as were those of Group *A*. Thus, although most of Group *A* were still superior in achievement, most of Group *B* appeared to have made about as satisfactory adjustment to their surroundings.

Various relationships are suggested in the findings presented, but any broad generalizations are unwarranted. Many variables are involved in a study of this nature and few can be controlled. More reliable and more valid measures are needed with a larger group of students before we can be at all sure as to the totality of factors operat-

ing and the extent to which each has affected educational and vocational achievement. More refined and precise measures of ability and achievement would increase the accuracy of the findings very materially. With these limitations in view, it seems reasonable to conclude that classification into differentiated groups did not prove detrimental to these pupils. The extra attention given and the interest in the two groups of exceptional pupils may have contributed to a more wholesome adjustment than would otherwise have resulted.

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ATTITUDES OF COLLEGE STUDENTS AND THE CHANGES IN SUCH ATTITUDES DURING FOUR YEARS IN COLLEGE

VERNON JONES

Clark University

INTRODUCTION

The purpose of this article is to present the results of a follow-up study of the conservatism-liberalism in attitudes of college students in certain fields. The attitudes singled out for investigation were attitude toward war, attitude toward race (the Negro), attitude toward religion, and attitude toward the church. The main questions to be considered are: (1) What changes take place in the conservatism-liberalism in attitudes of students between freshman and senior years in college? (2) What is the relation of such factors as intelligence, major subject, political preference, and religious affiliation to attitudes and to changes in attitudes? (3) How consistent are students in their conservatism or liberalism in attitude in different fields, and what is the bearing of this upon the problem of specificity or generality in the psychological organization of attitudes?

PROCEDURE AND EXPERIMENTAL MATERIAL

The study extended over a six-year period, during which two college classes were followed over four years. Two other classes were followed for shorter periods. The total number of classes tested, including those retested, was eleven. The total number of students who were tested at least once was three hundred eighty-one, and of these one hundred eighty-six were tested a second time. The number of students followed over four years was seventy-seven.

The measuring instruments used were five of the attitude scales edited by Thurstone. Specifically they were (in all classes except the two noted in the footnote below): The Attitude Toward War, Scale No. 2, Form *A*, by Droba; the Attitude Toward the Negro, Scale No. 3, Form *A*, by Hinckley; the Attitude Toward God (Influence on Conduct), Scale No. 22, Form *C*, by Chave and Thurstone; the Attitude toward God (The Reality of God), Scale No. 22, Form *A*, by Chave and Thurstone; and A Scale for Measuring Attitude Toward the Church, by Thurstone and Chave.[1]

[1] In the testing of one freshman class and one senior class a different form of four of the above scales was used. The scales employed in this case were Form *B*

All five scales are identical in general structure, each having been constructed according to Thurstone's technique and worked out under his direction. The method of construction has been described in detail in the literature[1] and need not be discussed here at any length. Suffice it to say that each scale consists of a number of statements ranging from a very conservative, or sometimes reactionary, view to a very liberal or sometimes radical one. The scale on attitude toward the Negro has sixteen statements, that on attitude toward the church has forty-five, and each of the others has twenty or twenty-two items. Each item of each scale has a scale value, and these range from about 0.2 to 10.5 in each scale.[2] The liberal statements have high scale values and the conservative ones have low values, except in the case of the scale on attitude toward God (Reality of) where the reverse is true.

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instead of Form *A* in the first test mentioned above; Form *B* instead of *A* in the second; Form *D* instead of *C* in the third; and Form *B* instead of *A* in the fourth. This second form of each of these scales was designated by its author or authors as an equivalent form to the first. However, in this study a small systematic difference was found between class averages based on the two forms of each test, and consequently the plan was adopted of using the same scales for initial and final testings. All results to be reported, therefore, have been based on the first-named battery except where the second battery is expressly mentioned.

[1] See Thurstone, L. L., and Chave, E. J.: *The Measurement of Attitude.* University of Chicago Press, 1929.

Thurstone, L. L.: "The Measurement of Opinion." *Journal of Abnormal and Social Psychology*, Vol. XXII, 1928, pp. 415–430.

Thurstone, L. L.: "Attitudes Can Be Measured." *American Journal of Sociology*, Vol. XXXIII, 1928, pp. 529–554.

See also Allport, F. H., and Hartman, D. A.: "Measurement and Motivation of a Typical Opinion in a Certain Group." *American Political Science Review*, Vol. XIX, 1925, pp. 735-760.

The essence of the method here employed originated with Allport and Hartman, but Thurstone improved the method by supplying a more satisfactory statistical method for obtaining scale scores for the items of the scale.

[2] The meaning of the scale values and the method of arriving at them are discussed in detail in *The Measurement of Attitude* by L. L. Thurstone and E. J. Chave. Essentially what was done in arriving at the scale values was to have several hundred judges place the various statements for a given scale in eleven piles to represent an evenly graduated series of attitudes from those at one extreme to those at the other. The percentage of judges placing a statement below each level, that is, below eleven, ten, nine, eight, etc., was calculated, and the level below which 50 per cent of the judges placed the statement—and above which fifty per cent placed it—was taken as the scale value of that statement. Thus a statement which was placed in the lowest pile, or pile one, by sixteen per cent of the judges and placed in or below pile two by fifty-seven per cent would receive a scale value of 1.8.

On the sheets which go into the hands of the students the statements with low and high scale values are intermingled, and, of course, the scale values are not given. The student is directed to read all the statements carefully and check those with which he agrees, and to place a cross in front of those statements with which he disagrees—except in the scale on attitude toward the church, where he merely checks those he agrees with. In the two scales measuring attitude toward God the student has the added instruction to place a double check in front of statements with which he strongly agrees.

The method of scoring each attitude test was to take the median of the scale values of the statements with which the student agreed. In the two tests in which double checks were employed the scale values of statements marked with double checks were entered twice in the distribution of scale values upon which the median was based.

The tests were administered by the writer as a group exercise to entire classes. In no class were there more than two members absent, and in most classes all members were present. This very large percentage representation of each class eliminated the possibility of the operation of selective factors within the groups sampled. As a part of the instructions the students were requested not to sign their papers. It was necessary, however, to have some method of matching the initial and final papers of a given student and consequently the plan was adopted of having each student place the tests in an envelope, seal it, and write his name on a little tab temporarily attached to the envelope. He was assured that his name would be removed from the envelope before it was unsealed. It is believed that this anonymity encouraged greater frankness on the part of students in registering their attitudes than otherwise would have prevailed.

In addition to the attitude test results, the following items of information were obtained for each student: (1) Mental ability as determined by the American Council Psychological Examination administered at the beginning of the freshman year, (2) major subject in college, (3) political leanings, (4) religious affiliation or leanings, (5) frequency of attendance at religious services, (6) occupation of father.

STUDENT AND COLLEGE SAMPLING

The present investigation was confined to the students of one college, and though there is little or no doubt as to the adequacy of the sampling of attitudes and of changes in attitudes in this institution, no

claim can be made that these are typical of exactly what would be found in other colleges.[1] In order that the reader may be in a position to judge for himself the extent to which College *X* provided a typical sampling, we shall present as many relevant facts as possible concerning the institution and its students, including data on the mental ability of the students as compared with those of the country as a whole, facts on the economic and social background of the students as revealed by the occupations of their fathers, and a comparison between the attitudes of our students and those of the few other institutions which have reported.

College *X* is a rather small New England liberal arts college for men. It forms part of a university with a moderate size graduate school. The number of faculty members giving instruction to undergraduate students is thirty-four. In this group are probably all shades of opinion ordinarily found in a liberal arts college. In point of training all members have Ph.D. degrees except three. Seventeen of the thirty-four received their undergraduate training in New England, three in the North and Middle Atlantic States, three in the South, eight in the Mid-West, and three abroad. Of the thirty-three instructors holding one or more graduate degrees, twenty-three did their graduate work in New England, four in the North and Middle Atlantic States, four in the Mid-West, and two abroad.

The student body is drawn chiefly from a large industrial city and the towns within forty miles radius. The median mental ability score of the freshmen has been for six successive years above that of the average student of the colleges reporting. In the 1934 examination, for

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[1] It would be impossible to find out what the exact averages are for the colleges of the country as a whole without sampling student opinion rather intensively in a very large number of colleges, and this would be very difficult for one experimenter to do. The difficulty consists in getting entire classes or absolutely random samplings of classes to fill out the attitude scales faithfully. If the marking of the scales is placed on a voluntary basis, there is reason to believe that the sampling may not be representative. If all students or a randomly selected list of students of a class are required to mark the scales, there is danger that the students who are less willingly coöperating will not register their true attitudes. Time has to be taken to "sell" the purpose of the experiment to the students—in some cases individually—so that they will coöperate willingly. The writer made some attempts to get the coöperation of some other colleges, but in view of the rather personal nature of attitudes on such questions as war, race, and religion, administrators were reluctant to enter into a plan with an outside experimenter calling for a wide sampling of student attitudes in their institutions.

example, there were two hundred forty colleges involving fifty-two thousand four hundred thirty-five students which reported, and the median student of College *X* was exceeded by only twenty-four per cent of this total number of students. In the 1935 examination there were two hundred sixty-five colleges involving fifty-six thousand eight hundred ninety-five students reporting, and the median student of *X* was exceeded by thirty per cent of the students. If we compare the median of College *X* with the medians of other liberal arts colleges of New England reporting, we find that it is exceeded by from thirty-three to forty-five per cent of these colleges. The variability in scores on the mental ability test in College *X* was practically identical with the average variability in the other New England liberal arts colleges, and about seven-tenths as large as that based on the study of all the four-year colleges reporting. The economic and social background of the students, as indicated by the only measure we had; namely, occupations of fathers, was below the average of college students in general. The occupations of fathers, combined into a small number of classes, were as follows: In professions and executive positions in large business, nine per cent; merchants and heads of very small business, nineteen per cent; members of skilled trades and small farmers, thirty-three per cent; numbers of semi-skilled and unskilled trades, including factory workers, thirty-six per cent; unemployed, three per cent. In religious affiliation or leaning our group was fifty-two Protestant, twenty-one per cent Catholic, and seventeen per cent Jewish, the remaining ten per cent signifying no church preference.

In attempting to compare the attitudes of our group with those in other colleges we were not able to find many comparable data. No study like the present one, involving a follow-up of the same students over a four-year period in college, has been reported.[1] Thus we have no other sampling with which to compare directly our results on change scores. There are four studies in the literature, each reporting status scores in one of the scales here employed and one study reporting on two of the scales. We shall anticipate some of our results to show the degree of correspondence between the mean attitude of our sampling and that in these other colleges. In measuring attitude toward war

[1] Since this article was written a follow-up study on changes in attitude toward war has appeared in which the Peterson scale was used. See Farnsworth, P. R.: "Changes in 'Attitude toward War' during the College Years." *Journal of Social Psychology*, Vol. VIII, 1937, pp. 274–279. The direction of the changes found by Farnsworth and that reported in this study are in agreement.

on the Thurstone scale Carlson[1] reports a mean of 7.12 (SD, 1.01) for two hundred fifteen seniors at the University of Chicago. Sowards,[2] employing the same scale at the Kansas State Teachers College, finds a mean of 6.76 (SD, 1.94) for one hundred six seniors, and a mean of 6.64 (SD, 2.11) for one hundred seventy-nine college freshmen. In College *X* we find the mean based on one hundred sixteen seniors to be 7.36 (SD, .99), and the mean for two hundred eighty-six freshmen to be 6.8 (SD, .89). Thus in comparing our group of seniors with that of Carlson we get a difference in means of only .24 points. The difference between our seniors and those of Sowards was .60 points. The difference for freshmen was .17 points. On attitude toward God (Reality of), only one study comparable to ours has been made. Carlson[1] reports a mean based on two hundred fifteen seniors at the University of Chicago of 5.88 (SD, 1.89), whereas the mean in College *X* was found to be 5.97 (SD, 2.05). In attitude toward the church, Thurstone and Chave[3] employing an equivalent form to the one we used obtained a mean of 4.78 (SD, 1.93) on one hundred seven seniors at the University of Chicago, and a mean of 4.42 (SD, 2.07) for five hundred forty-eight freshmen. Telford[4] working with two hundred nineteen sophomores at the University of North Dakota obtained an average of 3.10. The mean for one hundred fifteen seniors at College *X* was 4.98 (SD, 2.20) and for two hundred eighty-four freshmen 3.53 (SD, 1.90). In a word, our seniors differed from Thurstone and Chave's by .20 points on the average; our freshmen differed from Thurstone and Chave's by .89 points and from Telford's sophomores by .43.

In attitude toward the Negro we had only two studies with which to compare. Bolton[5] reports the means of two similar groups in Georgia State College for Women. The mean attitude in one group ($N = 70$)

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[1] Carlson, H. B.: "Attitudes of Undergraduate Students." *Journal of Social Psychology*, Vol. V, 1934, pp. 202–213.

[2] Sowards, Genevieve S.: "A Study of the War Attitudes of College Students." *Journal of Abnormal and Social Psychology*, Vol. XXIX, 1934, pp. 328–333.

See also Pihlbach, C. T.: "Student Attitudes toward War." *Sociology and Social Research*, Vol. XX, 1936, pp. 248–254.

[3] Thurstone, L. L., and Chave, E. J.: *The Measurement of Attitudes.* University of Chicago Press, 1929.

[4] Telford, C. W.: "An Experimental Study of Some Factors Influencing the Social Attitudes of College Students." *Journal of Social Psychology*, Vol. V, 1934, pp. 421–427. Telford reports his means separately for different religious groups, and we have combined these into one figure.

[5] Bolton, E. B.: "Effect of Knowledge upon Attitudes toward the Negro." *Journal of Social Psychology*, Vol. VI, 1935, pp. 68–90.

was 5.97 and in the other ($N = 92$) was 6.09. The SD's were 1.21 and 1.06, respectively. Sims and Patrick[1] report the results from the application of the same scale to the students in psychology classes at the University of Alabama and at Ohio University. In the former institution one hundred fifty-six of the students studied were from Southern homes and one hundred fifteen from Northern homes. The number tested in the latter institution was ninety-seven, all from Northern homes. The mean scores for the three groups were 5.0, 5.9, and 6.7, respectively. The corresponding SD's were 1.0, 1.3, and 1.0. The mean attitude in College *X* was higher than that reported in any of these other colleges. It was 7.26 (SD, 1.17) for one hundred fifteen seniors and 7.34 (SD, 1.04) for two hundred eighty-nine freshmen. If we compute the weighted average for the students in Southern colleges from the results in Georgia State College for Women and the University of Alabama, we find it to be 5.60. This is 1.5 points more conservative than the average in College *X*—a significant difference. The Ohio group is slightly more conservative than ours, the difference being 0.5 points. On the basis of these comparisons we conclude that in attitude toward the Negro our sampling is not representative of the whole country; certainly it does not agree with a sampling of student attitude in the South.

So much for the description of the college and the students upon which the present study is based. From the facts given above, it seems safe to say that, with the exception of attitude toward the Negro, the sampling of attitudes here obtained is probably not far from what would be obtained from a random sampling of these attitudes in liberal arts colleges throughout most of the country. Doubtless they differ a good deal from the attitudes in certain schools or certain types of schools where particular stress is placed on any of these attitudes, such as might be found in military institutes, denominational colleges, and the like.

THE RESULTS

I. CHANGE FROM FRESHMAN TO SENIOR YEAR AS SHOWN BY FOLLOW-UP STUDY

The first results which will be presented are those on the follow-up study of two classes over four years of college. The entire freshman

[1] Sims, V. M., and Patrick, J. R.: "Attitude toward the Negro of Northern and Southern College Students." *Journal of Social Psychology*, Vol. VII, 1936, pp. 192–203.

classes of 1930 and of 1931 were tested at time of entrance on the five attitude scales. At the end of the senior year all the students of each of these classes who were still in college were retested. The total number of freshmen in the two classes combined was one hundred four, and of these seventy-seven were in college and were retested four years later. Practically all these students were seniors at the time of the retesting though three or four had dropped behind and were classified as juniors. However, since we are primarily interested here in the attitudes and the changes in attitudes of the men who had been in college for four years, we shall not try to distinguish between the full-fledged seniors and the few who had dropped behind their classes. For convenience we shall treat and refer to the entire group as seniors.

The results on the follow-up group are presented in Table I. Freshmen and senior averages, together with standard deviations of distribution, are given separately for each of the attitudes. These are followed by difference or change scores and the reliabilities of these differences.

As a supplement to Table I, which was on the follow-up group, we have computed the averages on each attitude for all freshmen and seniors who were tested. The results are given in Table II.

Tables I and II yield essentially the same results and they can be discussed together. Perhaps the most interesting column in each table is the fifth, which shows the difference between the freshman and senior averages. These differences show the average change in attitude from freshman to senior years, and it is for this reason that they are frequently referred to in this article as *change* scores as well as *difference* scores. It will be noted that in both tables these difference or change scores are in a positive direction in every attitude except that toward the Negro, where the differences are so small that they are statistically insignificant. That there was practically no change in attitude toward the Negro is not at all surprising when it is considered that the students of College *X* do not come in contact in any concrete way with the race problem as it involves the relations between Negroes and whites.

In all other attitudes, however, the differences were in the direction of liberalism and were in every case statistically reliable as shown by the ratio of the difference to the standard error of the difference. This consistent trend toward the liberal end of the scale in attitudes toward war, religion, and the church is perhaps the most important result in the table. It indicates that four years of life in college has some consistent influence on certain attitudes which are not directly taught. That

TABLE I.—AVERAGE SCORES FOR THE FRESHMEN AND FOR THE SENIORS OF THE FOLLOW-UP GROUP ON THE FIVE ATTITUDE SCALES, TOGETHER WITH DIFFERENCES AND RELIABILITIES OF DIFFERENCES BETWEEN THE FRESHMEN AND SENIORS ON EACH ATTITUDE

(N for each attitude is 77)

Attitude toward	Freshmen		Seniors		Difference (Seniors-Freshmen)	$\frac{\text{Difference}}{SD_{diff.}}$
	Average	SD	Average	SD		
War	6.53	.89	7.20	1.11	+ .67	4.19
Negro	7.23	.94	7.21	1.20	− .02	.12
Religion (influence)	4.06	2.15	5.92	2.73	+1.86	4.65
Religion (reality)	7.07	1.61	5.54	2.18	+1.53[1]	4.94
Church	3.97	2.12	5.12	2.28	+1.15	3.29

[1] The sign has been changed to plus in order to make its meaning agree with that in the other scales. On the scale involved here high scores were conservative and low scores liberal, which was opposite to the arrangement in all other scales.

TABLE II.—AVERAGE SCORES BASED ON ALL FRESHMEN AND ALL SENIORS ON THE FIVE ATTITUDE SCALES, TOGETHER WITH THE DIFFERENCES AND RELIABILITIES OF THE DIFFERENCES BETWEEN FRESHMEN AND SENIORS

Attitude toward	Freshmen (N = 286)		Seniors (N = 115)		Difference (Seniors-Freshmen)	$\frac{\text{Differences}}{SD_{diff.}}$
	Average	SD	Average	SD		
War	6.81	.89	7.36	.99	+ .55	5.00
Negro	7.34	1.04	7.26	1.17	− .08	.67
Religion (influence)	3.90	2.05	5.59	2.31	+1.69	6.76
Religion (reality)	7.23	1.52	5.97	2.05	+1.26[1]	6.00
Church	3.53	1.90	4.98	2.20	+1.45	6.30

[1] See footnote to Table I.

attitudes can be influenced by direct propaganda has been shown many times, but that changes toward liberalism in certain attitudes attend four years of normal life in college has not hitherto been demonstrated by following the same students over this period.

So far we have studied only the direction of the change and the size of the change in relation to the standard error of difference. The question immediately arises as to whether or not these changes were large in an absolute sense. That is, were the changes (or differences)

large in terms of actual statements agreed to? The answer to this can be given best by showing the degree of overlapping between freshman and senior distributions; and by referring the reader to the Thurstone scales for typical statements to which the average freshman and average senior subscribed.

Table III gives the distribution of the freshmen and the distribution of the seniors on each attitude studied. In order to make the distributions of the two classes directly comparable the frequencies have been given in percentages.

The first point to be noted in Table III is that the distribution of scores in each attitude was continuous in nature and the range was wide. Perhaps nothing could demonstrate more clearly than these distributions the fallacy involved in the statement frequently heard that the typical attitude of college students is this or that. At least with regard to attitudes toward war, the Negro, religion, and the church we can say that there is no one typical attitude in the sense that a large percentage share the same attitude. Attitudes on these questions vary on a continuum from the ultra conservative end to the ultra liberal end, with the number of students who subscribe to the statements at different points on this continuum tending to increase as we move in from the extremes toward the middle ranges.

In the second place the distributions show very vividly the large amount of overlapping between freshmen and seniors in each attitude. The "center of gravity" of each of the senior distributions, except that of attitude toward the Negro, is shifted somewhat toward the liberal end of the scale as compared with the freshmen, but there are very few shades of opinion held by any members of the senior class which are not also held by some freshmen. Much more striking than the differences between the freshman and senior distributions is the width of the spread within each class. It can be clearly seen that seniors as a group do not differ nearly as much from the freshmen as a group as the most conservative members of either class differ from their most radical brothers.

The reader who is interested in noting the difference in actual statements subscribed to by the average freshman and average senior will find it very easy to make this comparison if he will procure a copy of each of the scales and the attendant directions sheets from the University of Chicago Press.[1] On the sheet of directions for each scale

[1] Space will not permit the quoting of a sufficient number of the statements here to do justice to the scales, and it is for this reason that the reader is referred to the entire scales.

TABLE III.—DISTRIBUTIONS OF ALL FRESHMEN AND SENIORS ON ATTITUDES TOWARD WAR, THE NEGRO, THE INFLUENCE OF GOD ON CONDUCT, THE REALITY OF GOD, AND THE CHURCH
(The frequencies are in percentages)

	War			Negro			Influence			Reality			Church		
	Scores	Freshmen	Seniors	Scores	Freshmen	Seniors	Scores	Freshmen	Seniors	Scores	Freshmen	Seniors	Scores	Freshmen	Seniors
	9.5—	....	1	9.5—	2	7	9.0—	....	3	9.4—	1	....	9.0—	1	7
	9.2—	....	....	9.2—	1	....	8.6—	1	6	9.0—	4	1	8.6—	1	3
	8.9—	1	1	8.9—	2	1	8.2—	1	5	8.6—	10	7	8.2—	2	3
	8.6—	2	9	8.6—	1	2	7.8—	2	8	8.2—	15	6	7.8—	....	2
	8.3—	3	7	8.3—	12	9	7.4—	2	6	7.8—	13	6	7.4—	2	3
	8.0—	3	9	8.0—	5	3	7.0—	3	4	7.4—	15	7	7.0—	1	3
	7.7—	7	13	7.7—	13	2	6.6—	4	6	7.0—	10	10	6.6—	4	3
	7.4—	12	9	7.4—	7	12	6.2—	3	9	6.6—	8	12	6.2—	3	4
	7.1—	1	8	7.1—	23	23	5.8—	6	9	6.2—	3	9	5.8—	2	5
	6.8—	25	18	6.8—	11	14	5.4—	5	1	5.8—	4	3	5.4—	1	6
	6.5—	11	7	6.5—	9	9	5.0—	2	3	5.4—	5	5	5.0—	3	9
	6.2—	14	9	6.2—	3	4	4.6—	1	1	5.0—	2	3	4.6—	4	5
	5.9—	7	3	5.9—	3	1	4.2—	13	9	4.6—	....	3	4.2—	4	4
	5.6—	7	2	5.6—	4	6	3.8—	1	1	4.2—	7	8	3.8—	8	10
	5.3—	3	....	5.3—	....	1	3.4—	4	1	3.8—	....	1	3.4—	6	3
	5.0—	1	....	5.0—	1	1	3.0—	7	6	3.4—	....	2	3.0—	8	6
	4.7—	2	2	4.7—	1	1	2.6—	4	4	3.0—	2	3	2.6—	9	6
	4.4—	1	....	4.4—	....	2	2.2—	15	14	2.6—	....	2	2.2—	13	8
	4.1—	....	2	4.1—	1	....	1.8—	12	4	2.2—	1	9	1.8—	11	7
	.....	....	....	3.8—	....	....	1.4—	8	....	1.8—	....	3	1.4—	16	3
	.....	....	....	3.5—	1	2	1.0—	6	....	.....	....	....	1.0—	1	
Total (per cent).....	.....	100	100	.....	100	100	.....	100	100	.....	100	100	.....	100	100
No. cases (base).....	.....	286	116	.....	289	115	.....	288	114	.....	289	116	.....	284	115
Mean[1].....	.....	6.81	7.36	.....	7.34	7.26	.....	3.90	5.59	.....	7.23	5.97	.....	3.53	4.98

[1] These means were computed on the distribution of actual frequencies. Means based on the percentage frequencies given here will approximate these means but will not in all cases agree exactly.

the scale-score for each statement is given. If the reader, therefore, will cull out the statements with scale scores corresponding to the means reported (in Tables I or II) for freshmen and for seniors, he will have before him the material for the desired comparison. Such a comparison will, it is believed, lead to two main impressions. In the first place, the statements with which both freshmen and seniors agree on the average appear logically to be in the middle ranges of possible attitude, that is, they will seem to be neither very conservative nor very radical. Secondly, the difference between the average freshman and the average senior in terms of actual statements subscribed to will seem very small in all attitudes. Indeed it is difficult to perceive the difference between two statements which differ by no more than one point. Thus in attitude toward the Negro and in attitude toward war the differences between freshmen and seniors will be found to be too small to be perceived from the examination of the statements. In attitudes toward religion and the church the differences are large enough to be perceived, but the smallness of the difference in terms of types of statements actually agreed with stresses the fact that the average change from freshman to senior year, though a statistically significant change, is not a change from something bordering on fundamentalism to something bordering on atheism. It is rather a change from moderate liberalism to a little more liberalism.

(*To be concluded in February issue.*)

THE FRANKNESS OF SUBJECTS ON PERSONALITY MEASURES

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In the experimental try-out of a self-report questionnaire designed to measure certain types of personality conflict, the population, one hundred ninety-two high-school juniors and seniors, were instructed not to sign their names, and a careful technique was employed to secure frank and honest responses and to convince the subjects that their papers could not be identified. At the close of the experiment, they were asked to report what the effect on their responses would have been had their signatures been requested.

The purpose of this paper is to discuss the problem of signatures in personality measurement, describe the technique used in this study, and report the contrasting scores made on the Experience Appraisal* by groups reporting various attitudes toward signing their names to such a measure.

Research workers attempting to build instruments to measure various aspects of personality adjustment have indicated little concern about the problem of the test subject's willingness or reluctance to describe himself frankly on the usual self-report type of instrument. Taking their techniques largely from the parent field of intelligence testing, where the possibility of evasion or deception does not offer the subject an opportunity to give a more favorable impression of himself, the makers of most personality tests have asked their experimental subjects to sign their names. Aside from the request for frank responses and the usual statement that information revealed would be held in confidence, few precautions have been taken in the standardization of existing personality measures to insure frankness. The writer has discovered only one study (1) in which such a measure has been administered anonymously or under conditions such that the subjects on which it was standardized could feel reasonably secure in their unfavorable revelations.

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* A paper-and-pencil instrument designed to measure personality conflict through an evaluation of the discrepancies between the subject's self-description on a variety of personality items, and his ideals, his parents' ideals, his parents' behavior and his closest associates' behavior, as he reports these on corresponding items.

Clinical psychologists and other case workers, in contrast with research workers, have looked with skepticism upon the symptom-inventory personality measures because of this possible source of error. Reflecting this attitude, the Tenth Yearbook of the Department of Superintendents (2, p. 362) cautions that anyone wishing to apply these tests "must assure himself that he is asking questions which the pupils are well able to answer and which, under the circumstances, they are quite willing to answer truthfully."

This danger of resistance and deception in the usual test situation, and the necessity of rapport between the tester and his subjects, is echoed by a number of critics of personality testing, and by research workers who represent the clinical point of view: Vernon (9, pp. 165–177), Rosenzweig (7, pp. 400–401), Uehling (8, pp. 462–467), and Watson (10, pp. 246–247) face various aspects of the problem in the application of the measures.

Watson warns again, as he has in earlier periodic reviews of personality and character measurement, that results "with every self-report form, must be interpreted, of course, in terms of the impression the subject wishes to give." He calls attention to the current tendency to proceed with refined statistical analysis of test responses while "ignoring the distortion of answers by the conditions under which the questionnaires were answered." In his summary of "the usual criticisms of self-report measures," two of his three criticisms relate to the present problem: "(1) Subjects do not answer reliably. (2) Answers are arranged to make a good impression; this is particularly true of the more intelligent or experienced persons, and in situations in which they suspect that their vocational status may be affected by the outcome."

A few experimental studies attack the problem. The findings are in sufficient agreement to justify the skepticism indicated above, and to warrant appropriate changes in the procedure of personality test construction.

Manzer (5, pp. 268–270) compared scores made on one of the better self-report measures with group-ratings and self-ratings. He found that the distribution of test scores was nearer that of the self-ratings than it was that of the group-ratings. From this he drew the inference that "the tendency to make 'flattering' scores, admittedly present in self-ratings, is also present to a considerable extent in the scores made on the Allport (Ascendance-submission) Test."

Olson (6, pp. 442–451) reviewed the experiments of Hendrickson (unpublished) and Maller (4, pp. 882–884), both emphasizing the

danger of deception on self-reports. Maller found that children's reactions when asked to sign their names were significantly different from their reactions when they believed they were working anonymously. To secure more "natural" responses he suggests that subjects be allowed to believe they are working anonymously and that identifying symbols be substituted for names.

Olson (6, pp. 442–451) administered the Woodworth-Mathews Personal Data Sheet to two groups of sixty and forty college women—junior and senior students of educational psychology preparing to become teachers—under initial instructions in which one group responded anonymously and one signed their names. The test was then repeated with the instructions reversed. His results indicate that students will report significantly more symptoms when they do not need to sign their names, and are somewhat readier to reveal feelings of unreality, boredom, and desire for escape, as well as specific physical symptoms with a neurotic implication. Certain likes, inferiorities, and fears were reported with approximately the same frequency under the two conditions. Under signature the frequency of responses decreased for fifty-six out of seventy-five items, nine items remained unchanged, and ten were raised somewhat in the frequency of response.

Kelly, Miles and Terman (3, pp. 206–215) report evidence on the ability of subjects to influence deliberately their scores on the Stanford Masculinity-Feminity Test. Subjects of both sexes were able to shift their scores enormously in either the masculine or the feminine direction when the purpose of the test was understood. These investigators conclude: "The susceptibility of other paper-and-pencil tests to intentional faking should be investigated."

In the light of these experimental findings, the problem appears to be such that it is doubtful if it can be adequately solved merely by improving the rapport with subjects in the test applications. Even if rapport with a given group, or an individual clinical subject, is achieved and truthful responses are obtained on the current personality measures, distortion may obtain if responses are interpreted on the basis of comparison with existing norms. If the problem is as significant as the studies reviewed indicate, it must be attacked in the original standardization of such instruments. In the present study, the test situation and the instructions to subjects were in marked contrast to those usually employed in the construction of previous personality measures.

EXPERIMENTAL ADMINISTRATION OF THE EXPERIENCE APPRAISAL

Several high schools were investigated, not only to find one which appeared to be typical but, equally important, to discover one in which the school administrators would permit a strictly anonymous experiment the results of which they would not be permitted to see.

Practically all of the senior and half of the junior classes in the school chosen were assembled without previous explanation in the school auditorium, and seated so that one or more vacant seats separated each subject from his neighbor.

The writer was then introduced by the school principal as a research worker from a near-by university who would appreciate the coöperation of the group in a research project to be conducted in a number of high schools of which this school was to be the first. He emphasized, as he had been carefully instructed to do, that this coöperation was to be entirely voluntary, that the school authorities were not participating in any way, would not see the results, and would not know which students took part and which decided to withdraw. Any students who in the beginning or during the progress of the experiment might decide to withdraw were given full permission to return to their homerooms or laboratories or to the library to devote the two periods to whatever work they wished to do. The principal then withdrew, and two pupils of the group of two hundred twenty followed.

A sheet was then distributed requesting such information as: name, age, school, school grade, church attendance, position in the family, number of brothers and sisters; with the note—"This information is needed to identify the *groups* participating in the experiment, not the individuals." The sheet also contained a serial number, which it was explained would be used to mark the mental test scores and grade averages of the participants to be secured from the school records, after which all information on this sheet would be recorded by number only and the names destroyed.

The identification sheets were then collected and two hundred copies of the Experience Appraisal, each bearing a hidden corresponding number, were circulated.

The remarks of the principal were then repeated, the subjects being again encouraged to leave if they did not feel free to answer the questions in the blank. It was pointed out that there were not enough blanks to go around, that at least twenty persons would not be able

to participate so no one need stay because he felt sensitive about leaving.

Six pupils left at once, apparently after seeing the length of the questionnaire. When the rest had read the instructions and glanced through the first section of the blank, those who did not have blanks, were asked to leave and any others who cared to. To those who decided to remain, it was again explained that they could leave at any time during the experiment if they changed their minds about participating.

Of the two hundred blanks distributed, one hundred ninety-two completed copies were secured: Eight blanks could not be used: One disappeared, apparently carried away by someone leaving the room; two were mutilated, the last page of the test being torn off; two were incomplete, these subjects being slow readers who could not get through the last sections before the time allowed was up; the remaining three could not be used because in each, two or more pages in the questionnaire were accidently left blank.

While the subjects were reading the instructions on the blank itself, a member of the school faculty entered the auditorium, picked up an extra copy of the test lying on the platform, and began to examine it in the view of all the group. The test was at once taken from him and he was told that the experiment was strictly confidential and that no one connected with the school could be permitted to see the test or the results. All of the group saw and heard the incident, and it is believed that it greatly strengthened their feeling of security in the situation. After this no other subjects withdrew and the order and coöperation throughout were excellent.

Despite Vernon's (9, p. 172) conviction as to the importance of the self-help incentive—he reports that all subjects are anxious to find out anything they can about their personalities—little effort was made to employ it in this experiment. To do so would have disturbed the emphasis placed upon the fact that no blanks would be identified by name. The question was asked in the group if individuals could find out after the experiment "about how they did on the test." To this was replied that this was not a "test" in the usual sense and an individual's response on it would not be discussed with him because this would require identification by name. It was announced, however, that in return for their coöperation, the experimenter would discuss with any subject any psychological problem about which he wished advice, or any personal problem that might be suggested by the taking of the test. At the close of the experiment more than a dozen

pupils scheduled conferences. Three others attached notes to their questionnaires asking such appointments.

It is difficult to know what incentives motivated the participants. Principally, they were asked as students to assist another student in a project that they would find interesting and important. The writer was informal in his remarks and tried to create as pleasant and friendly an atmosphere as possible.

From the instructions printed on the blanks, it may be seen that the main incentive was a desire to "assist science in an important aspect of its work." Such a motivation it is believed is a strong one with typical students, if it involves no personal risk on their parts.

The printed instructions were as follows:

"WHAT I HAVE OBSERVED ABOUT MYSELF AND OTHERS"

A Contribution to the Study of Human Nature

Psychology, as you know, concerns itself with the study of human behavior. For many years scientists have been devoting much time and serious effort to the investigation of human nature and the solution of problems that are of great importance to human welfare. Their efforts are of great value to all of us.

Today you are given an opportunity to assist science in an important aspect of its work. There are two reasons for this; 1. High-school students are believed to be fairly keen observers of their fellow beings; 2. the high-school student body is much more representative of the population at large than are the usual college or adult groups.

There are many things which you alone can tell about your attitudes and your behavior that are of great importance to science.

In addition you can aid further by giving your observations of others whom you know well,—your associates, your close friends, your parents, etc.

DO NOT SIGN YOUR NAME TO THIS REPORT

The value of your help in this study depends entirely upon your answering the questions with absolute frankness and honesty.

Some of the questions about yourself and others are such as you would very properly decline to answer if your responses, and those about whom you report, could be identified.

For this reason, all the sections of this report are anonymous and strictly confidential. It is important that you bear in mind that no one who knows you will see your report or identify your answers.

Read each question carefully, and indicate your responses by checking the appropriate statement with an X. *Your handwriting will not appear on any part of the report.*

When you have finished all the problems on a page turn over to the next page. *Do not turn back to reconsider any page you have already checked.*

Thank You!

In the conferences mentioned above, and during interviews with fifty other subjects selected for case studies, only two persons were discovered who were skeptical about the confidential nature of the experiment. In these two cases, their suspiciousness developed, they said, after they had revealed themselves very frankly on the questionnaire and had then discussed it with friends who were not present in the experiment. None of the subjects interviewed discovered the aspect of personality being measured, nor the disguised scoring method employed.

The frequencies of response on the more threatening items in the instrument indicate that a reasonable degree of frankness was secured. A few of such responses are reported below:

Thirty-three nine-tenths per cent confessed that they sometimes cheat in their class work;
Fifty-one three-tenths per cent admit that they "indulge in risque or shady stories now and then";
Three one-tenth per cent say they "love their mother less than most children";
Four one-tenth per cent say they love their father less than most children.
Forty-seven seven-tenths per cent reveal that they "indulge in kissing and petting parties now and then"; and
Nine two-tenths per cent admit they "often indulge in kissing and petting parties";

On an item concerning the frequency of sex thoughts and phantasies,

Twenty-one five-tenths per cent say they rarely run through their minds;
Seventy-six four-tenths per cent say they occur now and then; and
Two one-tenth per cent say they are present most of the time;

On an item asking how often they have trouble with the school authorities,

Sixty-eight two-tenths per cent say rarely or never;
Twenty-eight seven-tenths per cent say "the usual amount" of such trouble;
Three one-tenth per cent say often.

Not only frankness, but a fair degree of objectivity is seen in the following responses:

Fifteen four-tenths per cent say their family is better off than the average financially;
Seventy-six nine-tenths per cent say their family is about average financially;

Seven seven-tenths say their family is poorer than the average;
Thirty-six nine-tenths per cent say their mother has little spending money;
Twenty-six one-tenth per cent say their father has little spending money;
Fifteen nine-tenths per cent say they are better looking than the average; and about the same proportion say they are able to dress better than the average;
Twenty five-tenths per cent report that their school marks are above the average;
Seventy-five nine-tenths per cent report their marks are about average;
Three six-tenths per cent report "poor marks,—grades below average";
Twenty-six seven-tenths per cent say they are above the average in intelligence;
Seventy-two eight-tenths per cent say they are about average in intelligence; but only one subject rated himself definitely below the average in intelligence.

At the end of the questionnaire the subjects were asked what the effect would have been if their signatures had been requested. The following instructions appeared at the bottom of the last page of the instrument:

Turn in Your Papers without Signing Them

Please check the statement below which best fits your reaction to this report—

If my signature had been called for in this report—

1. I would have left some of the questions unanswered._____
2. I would have answered some of the questions untruthfully._____
3. I would have answered truthfully but resentfully._____
4. I would have willingly answered truthfully._____

—Thank You—

More than one response was checked by twenty-seven subjects. Considering only the single responses the results were as follows:

Twenty-one nine-tenths per cent (of the total group of one hundred ninety-two) said they would have left some of the questions unanswered;
Eight nine-tenths per cent said they would have answered some of the questions untruthfully;
Twelve per cent said they would have answered truthfully but resentfully;
Forty-three two-tenths per cent said they would have willingly answered truthfully.
Fourteen one-tenth per cent checked two or more responses.

In Table I are grouped together all the individuals reporting each attitude or combination of attitudes. After each grouping is shown the number of persons so reporting, the per cent of the total group,

the Mean Conflict Score on the Experience Appraisal, and the Standard Deviation of each mean.

The last group in the table is the only group who say without qualification that they would have told the truth willingly even though

TABLE I.—GROUPS REPORTING VARIOUS ATTITUDES TOWARD SIGNATURE

	N		Per cent	M Cf score	*σ*
Cases checking one response only	165		86.9	105.85	42.72
Cases checking two responses	27		14.1	94.26	40.45
Total population	192		100.0	104.22	42.60
Group checking only #2					
2. I would have answered some of the questions untruthfully	17		8.9	119.7	43.54
Group checking only #3					
3. I would have answered truthfully but resentfully	23		12.0	118.9	47.25
Grouping of all who checked #2 (single and double responses combined)					
2 (only). I would have answered some of the questions untruthfully	*N*-17				
2 and 1. I would have left some of the questions unanswered	*N*- 3	22	11.5	115.45	43.74
2 and 3. I would have answered truthfully but resentfully	*N*- 2				
Grouping of all who checked #3					
3 (only). I would have answered truthfully but resentfully	*N*-23				
3 and 1. I would have left some of the questions unanswered	*N*- 8	33	17.2	110.15	44.39
3 and 2. I would have answered some of the questions untruthfully	*N*- 2				
Group checking only 1					
1. I would have left some of the questions unanswered	42		21.9	109.5	46.25
Grouping of all who checked 1					
1 (only). I would have left some of the questions unanswered	*N*-42				
1 and 2. I would have answered some of the questions untruthfully	*N*- 3				
1 and 3. I would have answered truthfully but resentfully	*N*- 8	67	34.9	103.96	45.09
1 and 4. I would have willingly answered truthfully	*N*-14				
Group checking only 4					
4. I would have willingly answered truthfully	83		43.2	97.50	37.08

signatures had been required. The fact that this group comprises eighty-three persons, or only forty-three two-tenths per cent of the total population, is ample justification for the anonymity of the experiment and the rather elaborate precautions taken to insure confidence that the identity of the subjects would be protected.

Significant also is the fact that this "truth group" has the lowest mean conflict score ($M = 97.5$) and that the groups grade up consistently in their mean conflict scores to the group checking only the response: "I would have answered some of the questions untruthfully," which has the highest mean conflict score ($M = 119.7$).

Therefore it is inferred that had the instrument been taken under signatures, not only would a large number of the subjects have resented, evaded, and falsified some of the items, but such deception would have been greatest among those having the greatest amount of conflict. In short, the purpose of the instrument—the measurement of conflict—would have been invalidated.

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THE STUDY PRACTICES OF THREE HUNDRED NINETY-FIVE HIGH-SCHOOL PUPILS

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THE SOURCE OF THE DATA

To three hundred ninety-five boys and girls in five high schools of medium size in southwest Minnesota were administered check lists or questionnaires for the purpose of gathering data relative to their attitudes and practices, particularly the latter, with respect to study. They were distributed throughout grades IX, X, XI and XII in about the usual proportion of enrollments.

The items in the check list are reproduced below. At the right of each item was provided space to check under one the following four headings: "never," "occasionally," "usually," or "always."

METHODS OF PROCEDURE AND MEMORIZING

Activity.

1. Look up in dictionary any new word which is not clear in meaning.
2. Skim over printed material before reading it in detail.
3. Review ideas and facts secured from printed pages immediately after reading them.
4. Analyze in detail the tables which appear as part of the contents of material read.
5. Read silently without moving lips.
6. Search for most important points while reading.
7. Mark personal books to make ideas stand out more clearly.
8. Reread the total lesson after studying each part of the lesson separately.
9. Seektopic sentence of each paragraph while reading.
10. Raise questions about material as it is being read.
11. Read footnotes while going through an article or book.
12. Make diagrams or charts to make ideas more clear.

13. Make a definite effort to use new words.
14. Review previous work before beginning on advanced work.
15. Pay attention to weak points in knowledge.
16. Get lessons thoroughly from day to day in order to avoid cramming for an examination.
17. Get help from members of family on hard part of lesson.
18. Get help from members of class.
19. Get help from teacher outside of class on hard part of lesson.
20. Try to study for class just before it meets.
21. Try to study for class just after it recites.
22. Read your work over carefully before turning it in.
23. Distribute your practice periods while memorizing a selection.
24. Use memory schemes to help memory.
25. Make frequent use of reference guides such as book indexes, encyclopedias, etc.
26. Recite silently to self when reviewing a lesson.
27. Get a clear notion of the task before beginning the work of a particular study period.
28. Memorize material in a lesson to be sure of retention.
29. Work intensively during study periods.
30. Set a certain goal to accomplish during each study period.
31. Follow closely the material presented by a classmate or by the teacher during a recitation period.
32. Pick out questions that may be asked in examinations.

Note Taking.

1. Take notes while reading or studying.
2. Make a written summary of material read.
3. Take notes on lectures or talks by the teacher.
4. Take notes on uniform paper or in bound notebooks.
5. Keep notes for any one subject together.
6. Take notes when not required to do so.
7. Review notes from time to time.
8. Review notes before examination.
9. Take notes on daily assignment.
10. Make headlines in notebook something like those in a modern newspaper.

Concentration and Distraction.

1. Ignore distractions while studying or reading.
2. Keep thinking of other things while studying.
3. Mind seldom wanders when subject-matter is interesting.

TABLE I.—PERCENTAGE AND NUMBER OF PUPILS WHO LOOK UP NEW WORDS IN DICTIONARY AND SCHOLASTIC AVERAGES OF THE VARIOUS GROUPS

Procedure		Per cent following procedure	Scholastic average	Number of pupils
Group I: IQ below 90	Never	6	79	3
	Occasionally	49	76	26
	Usually	39	80	21
	Always	6	81	3
	Total	100	79	53
Group II: IQ 91–100	Never	2	77.5	2
	Occasionally	52	80	50
	Usually	45	82	44
	Always	1	85	1
	Total	100	81	97
Group III: IQ 101–110	Never	3	79	3
	Occasionally	42	81	45
	Usually	52	84	57
	Always	3	82	3
	Total	100	81.5	108
Group IV: IQ 111–120	Never	7	80 −	5
	Occasionally	44	84	33
	Usually	45	85	34
	Always	4	77.5 −	3
	Total	100	81.5	75
Group V: IQ above 120	Never	5	82	3
	Occasionally	38	84	24
	Usually	52	87	32
	Always	5	84	3
	Total	100	84	62
Group VI: Averages	Never	3+	80	16
	Occasionally	46	81	178
	Usually	46	83+	188
	Always	5	84	13
	Total	100	82	395

4. After finishing one lesson, have difficulty beginning another.
5. Watch people entering or leaving room, going to assembly desk, etc.
6. Stop at end of paragraph or page to see if you can recall most important parts.
7. Look up points you don't seem to recall.
8. Make sure that you understand everything.

The replies were tabulated in five subdivisions of pupils of the following ranges of intelligence quotient: Group I, fifty-three pupils below 90; Group II, ninety-seven pupils 91–100; Group III, one hundred eight pupils, 101–110; Group IV, seventy-five pupils, 111–120; Group V, sixty-two pupils above 120.

THE RELATIONSHIPS BETWEEN STUDY PRACTICES AND SCHOOL MARKS

An analysis of the data disclosed the startling facts that within any given small range of intelligence, with few exceptions, there were

TABLE II.—DISTRIBUTION OF PROCEDURE SHOWING PERCENTAGE, NUMBER OF PUPILS AND SCHOLASTIC AVERAGE OF VARIOUS IQ GROUPS IN RESPONSE TO QUESTION, "DO YOU SKIM OVER MATERIAL BEFORE READING IN DETAIL"

Procedure		Per cent following procedure	Scholastic average	Number of pupils
Group IV: IQ 111–120	Never	10	82.5	6
	Occasionally	45	85.	33
	Usually	30	86.1	23
	Always	15	85.6	11
	Total	100	82	75
Group V: IQ above 120	Never	26	80.3	15
	Occasionally	27	88.2	16
	Usually	31	88.	18
	Always	16	84.2	9
	Total	100	85.1	58
Group VI: Averages	Never	17	81.5	66
	Occasionally	40	83.5	161
	Usually	31	84.2	116
	Always	12	83.	46
	Total	100	83	389

no material differences in average high-school marks between those who had different practices with respect to the study techniques involved.

As an example, there is given below the table resulting from an analysis of the data relating to the practice, "Look up in dictionary any new word which is not clear in meaning."

There were few significant or noteworthy differences in marks between the groups differentiated on the basis of their practice with respect to the various procedures. The more pronounced differences were to be found in the portions of the statistical analysis which are given here as Tables I through VI.

TABLE III.—DISTRIBUTION OF PROCEDURE SHOWING PERCENTAGE, NUMBER OF PUPILS AND SCHOLASTIC AVERAGE OF VARIOUS IQ GROUPS IN RESPONSE TO QUESTION, "DO YOU READ SILENTLY WITHOUT MOVING LIPS"

Procedure		Per cent following procedure	Scholastic average	Number of pupils
Group II: IQ 91–100	Never	1	77.5	1
	Occasionally	9	78.7	8
	Usually	21	80.9	19
	Always	69	82.0	66
	Total	100	79.7	94
Group VI: Averages	Never	1	80	4
	Occasionally	5	80	17
	Usually	20	83.6	73
	Always	74	83.4	291
	Total	100	81.7	385

Non-statistically these trends may be stated thus:

1. Apparently at all levels of intelligence the practice of looking up new words in the dictionary is positively associated with better marks (Table I).

2. Of pupils of definitely superior intelligence, those who make most regular practice of skimming over material before reading in detail make better marks (Table II).

3. "Always reading silently without moving lips" is the more invariable practice of those who make the highest marks, particularly in the 91–100 IQ group (Table III).

4. Those who usually get their lesson thoroughly from day to day in order to avoid cramming tend to do slightly better than those who

TABLE IV.—DISTRIBUTION OF PROCEDURE SHOWING PERCENTAGE, NUMBER OF PUPILS AND SCHOLASTIC AVERAGE OF VARIOUS IQ GROUPS IN RESPONSE TO QUESTION, "DO YOU GET LESSON THOROUGHLY FROM DAY TO DAY IN ORDER TO AVOID CRAMMING"

Procedure		Per cent following procedure	Scholastic average	Number of pupils
Group III: IQ 101–110	Never.....	0	0	0
	Occasionally.....	10	82.5	11
	Usually.....	59	82.7	63
	Always.....	31	84.6	32
	Total.....	100	83.2	106
Group IV: IQ 111–120	Never.....	0	....	0
	Occasionally.....	8	81.6	6
	Usually.....	64	85.5	47
	Always.....	28	86.2	20
	Total.....	100	84.4	73

TABLE V.—DISTRIBUTION OF PROCEDURE SHOWING PERCENTAGE, NUMBER OF PUPILS AND SCHOLASTIC AVERAGE OF VARIOUS IQ GROUPS IN RESPONSE TO QUESTION, "DO YOU TRY TO STUDY FOR CLASS JUST BEFORE IT BEGINS"

Procedure		Per cent following procedure	Scholastic average	Number of pupils
Group IV: IQ 111–120	Never.....	12	83.1	8
	Occasionally.....	24	84.1	18
	Usually.....	44	86.3	31
	Always.....	20	87.1	15
	Total.....	100	85.1	72

do not, especially in the group slightly superior in intelligence (Table IV).

5. A like slight superiority in marks seems to go with "studying for a class just before it begins" for the 111–120 IQ group (Table V).

6. Of the least intelligent group, those who always reviewed notes before examinations made better marks than those who did so usually or only occasionally, though no similar difference could be noted for other intelligence groups (Table VI).

One conclusion growing out of these data is not particularly satisfying, especially to those who have made much of teaching pupils *how to study;* namely, that apparently differences in study methods are not of primary importance in making marks. On the other hand, it should not be overlooked that it is possible that some pupils employ one good method and not another, while others do the reverse, in situations in which either of the two methods is useful, but in which little is gained in using both as compared to using one or the other.

TABLE VI.—DISTRIBUTION OF PROCEDURE SHOWING PERCENTAGE, NUMBER OF PUPILS AND SCHOLASTIC AVERAGE OF VARIOUS IQ GROUPS IN RESPONSE TO QUESTION, "DO YOU REVIEW NOTES BEFORE EXAMINATION"

Procedure		Per cent following procedure	Scholastic average	Number of pupils
Group I: IQ below 90	Never.....	0	....	0
	Occasionally.....	4	77.5	2
	Usually.....	26	77.8	14
	Always.....	70	80.5	36
	Total.....	100	78.6	52

Only one study practice seems to be definitely associated with intelligence. The percentage who always read silently without moving their lips increased markedly from low to higher intelligence grouping—fifty-nine, sixty-nine, eighty, eighty, eighty-eight.

THE QUESTIONNAIRE DATA

Certain other interesting data with respect to conditions related to their study were obtained by means of the questionnaire:

1. Of the three hundred ninety-five students sixty per cent said they had received some instruction in how to study.

2. To the question, "Do you have regular study hours?", three hundred sixteen, or eighty-one per cent, replied in the affirmative, and two hundred seventy-two, or seventy per cent, stated further that they had regular times in the day to study for each class.

3. Only fifty-two per cent had a special place at home in which to study.

4. Contrary to recommendations of those who have written advice on the subject, fifty-four per cent report that they usually study with others.

5. Of the three hundred ninety-five, seventy per cent reported difficulty in getting started to study.

INTELLIGENCE AS A DETERMINANT OF THE "FUNCTIONAL" VALUE OF CURRICULAR CONTENT

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INTRODUCTION

In a survey of current educational practices one notes particularly a preoccupation with curricular revisions induced by the momentum of the "progressive education movement" or by the pressure of numbers of relatively unselected students upon the institutions of higher learning. As a consequence the concept of the "functional" evaluation of curricular content or subject-matter seems to be invoked too freely and too frequently. Indeed "functional" and "non-functional" in current educational usage have largely metamorphosed into laudatory and denunciatory epithets, respectively, as have their more general counterparts, "progressive" and "traditional" education.

Aside from the emotional aura the criteria of "functional" value appear remarkably meagre and to be lacking in the precisioned objectivity of scientific method. Perhaps the most objective criterion advanced along these lines is that of percentage of retention of material after a fixed period of time. Thus Pressey[1] considers low percentage of retention to be primarily an indictment of the curriculum rather than of instructional procedures. There are two grave defects in such a criterion of "functional" value. First, retention is no guarantee of utility in either a qualitative or quantitative sense. The conditions of learning are such as to facilitate retention of the bizarre, the novel, or startling item and thus to leave a residue of unrelated facts or "useless" information. In other words, it is just as valid to say that a curriculum is damned by what is retained as it is by what is lost. Second, the use of percentage of retention in unselected or heterogeneous groups as a selective criterion for curricular content ignores the qualitative and quantitative differences in retention which depend upon individual differences in intelligence. A uniform curricular content (whether it occurs in "progressive" or in "traditional" schools) for students of all degrees of ability disregards *individual differences.* It is inapplicable, except with injustice and injury to some particular section of the intelligence distribution. The net result of

[1] Psessey, S. L.: *Psychology and the new education.* New York: Harpers, 1933, pp. xxxi + 594.

much of present-day educational policy appears to be a regression of curricular content in the direction of suitability for individuals of lesser ability, whereas in the past the system was geared more closely to those with higher ability. "Progressive education," in practice, apparently faces the problem of differential curricular content and differential instructional techniques in no more realistic a manner than did "traditional" education.

Still more susceptible to lack of definition is the determination of "functional" value in relation to "life situations."[1] From the bio-social point of view a "life situation" is simply a situation in which living organisms are involved, but in actuality the phrase is meaningless as applied to the nature of curricular content, since all curricula are "life situations." The distinction desired is between those activities of human beings which the given educator considers most valuable, interesting, or satisfying, and those which have no meaning or significance for him. If we stop here, we find ourselves rambling about in the subjective realm of values, with an unpredictable destination.

To make our educational planning objective and dependable, the prerequisite steps toward a revision of practices in curriculum-planning should include actual research to determine:

1. What material is used;
2. In what connection it is used;
3. *By whom* it is used;
4. The optimum time of incidence for learning;
5. The relative degree of difficulty in learning for the various representative types of student;
6. The necessary instructional techniques to achieve that degree of retention and understanding which it is essential to achieve. If these steps are not taken one must necessarily ignore individual differences to the detriment not only of the individual but of society as well. Unfortunately, this result is now the common one.

THE PROBLEM

Specifically this study seeks to answer the following questions:

1. Does algebra have any "functional" value (in the sense of retention from incidence in high school and actual use in problem solving) for freshman matriculants in a teachers college?

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[1] Heaton, K. L.: *The character emphasis in education.* Chicago: University of Chicago Press, 1933, pp. ix + 415.

2. Does such retention and use bear any relation to prevalent individual differences in intelligence?

PROCEDURE

The ACE Psychological Examination blanks of twelve hundred twenty-nine freshmen matriculating at a teachers college from 1931 through 1935 were examined to determine which individuals had employed algebraic procedures or "algebraic thinking" in the solution of the problems in the Arithmetic section of the test. Even if the solution of only one problem was approached through the use of a simple equation for the solution of x, the unknown, the individual concerned was classified as employing algebraic procedure. Test blanks which lacked evident computations or which contained erasures so that procedure could not be identified were excluded from consideration and the remaining papers were classified as evidencing arithmetical thought. Measures of central tendency, variability, and reliability were computed for the scores on the Arithmetic section of the test for the two groups of individuals, "Arithmetic" and "Algebra," in order to determine whether differences in score were necessary consequences of differences in usage or procedure.

The total psychological scores for both groups were treated alike, all scores being converted to 1931 equivalents by means of the national percentiles. This step was taken because of slight fluctuations in the PR of various scores from year to year. A common base for a study extending over several years seems desirable and 1931 has served as the base for other studies of the rôle of intelligence among college students.[1,2,3]

RESULTS

The rôle of algebraic thought and procedure as contrasted with a purely arithmetical approach to the solution of the problems in the Arithmetic section of the ACE Psychological Examination is revealed in *Table I*. From this one may note that:

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[1] An unpublished article by Wise, V. and Pratt, K. C.: "The relation of intelligence to age of matriculation in a teachers college."

[2] Pratt, K. C.: "Differential selection of intelligence according to denominational preference of college freshmen." *J. Soc. Psychol.*, 1937, 8, 301–309.

[3] Pratt, K. C. and Wise, V.: "Do marking systems based upon the normal probability curve insure an equitable distribution of marks in elective curricula?" *J. Exp. Educ.*, 1937, 5, 261–270.

1. Those individuals employing algebra make a significantly higher score on the Arithmetic section than those employing arithmetic exclusively. The "algebraic usage" mean is 7.2, the "arithmetic usage" mean is 5.3, and the critical ratio of difference of means to probable error of difference is 13.6.

TABLE I.—THE RÔLE OF ALGEBRA IN THE SOLUTION OF THE ARITHMETIC PROBLEMS OF THE AMERICAN COUNCIL PSYCHOLOGICAL EXAMINATION

	Algebraic usage		Arithmetic usage	Difference
Arithmetic score (unweighted).				
N	550(44.75%)	....	679(55.25%)	
Mean	7.2	....	5.3	
SD	3.7	....	3.4	
PE_m	.11	....	.09	
Critical ratio	.....	13.6		
Total ACEP score.				
Median	145.6	....	111.0	
Mean	148.9	....	116.3	
SD	52.5	....	47.8	
PE_m	1.5	....	1.2	
Critical ratio	.....	17.2		
ACEP — weighted arithmetic score.				
Mean	120.3	....	94.8	
Per cent of total points possible (286).	42.1	....	33.1	9
Per cent of total weighted arithmetic score (80)[1]	36.0	....	26.5	9.5

Legend: Unweighted arithmetic score, number of problems right.
Weighted arithmetic score, number of problems right × 4 as specified in directions for scoring.

[1] Mean of unweighted arithmetic score of group employing "Algebraic usage" is 7.2. Weighting this $7.2 \times 4(100)/80 = 36$. In like manner 26.5 is obtained for those employing "Arithmetic usage."

2. Those individuals employing algebra make a significantly higher score on the total Psychological Examination than those employing arithmetic exclusively. The "algebraic usage" mean is 148.9, the "arithmetic usage" mean is 116.3, and the critical ratio of difference of means to probable error of the difference is 17.2.

3. The superiority in total psychological test score of individuals employing algebra is not ascribable solely to the fact that they make higher scores on the Arithmetic section of the test. The difference in the psychological or intelligence scores of the two groups is 32.6, whereas

the difference in weighted Arithmetic section score is only 7.6 (*i.e.*, 1.9×4) leaving a residue of twenty-five points ($32.6 - 7.6$) not attributable to the Arithmetic section of the test.

4. The students who employ algebra maintain the same degree of superiority in the non-arithmetical as well as in the arithmetical portions of the Psychological Examination over those students who make use of purely arithmetical procedures. The maximum credit on the 1931 form of the ACEPE is three hundred sixty-six points, and when we deduct the eighty points on the Arithmetic section this credit is two hundred eighty-six points for the non-arithmetic sections. For this part of the test the mean score of the algebraic-usage group is 120.3 points or 42.1 per cent of the possible two hundred eighty-six points, whereas for the arithmetic-usage group it is 94.8 points or 33.1 per cent of the possible two hundred eighty-six points. Thus between the scores of the two groups we find a difference of nine per cent in the percentage of total possible points obtained. Of the total of eighty points possible on the arithmetic score the percentages for the groups were 36 and 26.5, respectively, a difference of 9.5 (in favor of the algebraic-usage group) in the percentage of total possible points obtained. It, therefore, seems evident that the more intelligent individuals either have greater flexibility of procedure in attacking such problems or that they have a "set" towards algebraic methods wherever these are feasible.

DISCUSSION

Every year, thousands of individuals matriculating at our colleges and universities are confronted with a "life situation" known as the entrance examination. In intelligence tests they are faced with problems involving arithmetical reasoning and which require solution in a limited period of time. In the Psychological Examination of the American Council on Education these problems are encountered in a section headed "Arithmetic," but the directions do not specify that only arithmetical procedures must be employed. Under these conditions the question may be raised regarding the "functional" value of algebra, required as entrance credit by most colleges. Can there be any carry-over, any application, of the procedures of algebra without a specific request for the use of such methods? If this actually occurs, what type of students do recall and employ algebra as a matter of course and by preference?

In the teachers college studied in this investigation 44.75 per cent of the students employed algebra as against 55.25 per cent who employed arithmetical procedures exclusively. If percentage of individuals showing retention and use of the given subject constitute an adequate criterion for curricular content we might decide, if given to arbitrary decisions in such matters, that since the majority do not use algebra there is no need for teaching it in high school. Some might urge that its study be postponed until a "felt need" manifested itself. Indeed it might be argued, as is the case, that algebra is not required for the solution of these problems.

Nevertheless the more intelligent students, on the whole, are the ones who employ algebraic procedures in the solution of such problems, although their increment of superiority is apparently no higher on this section than upon the remainder of the intelligence test.

CONCLUSIONS

1. Students who employ algebraic procedures and thought in the solution of the arithmetic problems of the ACEP examination make a higher score on that section than do those who employ arithmetical procedures exclusively.

2. Students who employ algebraic procedures make a higher score on the other portions of the Psychological Examination than do those who use arithmetical methods only.

3. If the scores upon this test are an index of the intelligence of the individual it is obvious that effective retention and use of learned materials depend upon superior intelligence.

4. On this basis it may be affirmed that intelligence is one of the chief determinants of the "functional value" of curricular content.

AN ANALYTICAL STUDY OF THE MacQUARRIE TEST FOR MECHANICAL ABILITY[1]

HARRIET BABCOCK AND MARION RINES EMERSON

Psychologists have long been cognizant of the inadequacies of quotients, be they IQ's, EI's, or MQ's, as reliable indicators of the individual's capacity for different fields of work. It has been only too obvious that many who scored low on tests did exceptionally well in the special work for which the tests purported to measure ability, while others who made high scores were most inadequate to the demands of work in those fields for which the tests indicated them to be best suited.

With the necessity of giving practical advice, however, psychologists have become increasingly aware of the need to ascertain the causes of success or failure in practical work when such success or failure is inconsistent with test scores. They have found it necessary to study analytically how individuals of the same general level of intelligence differ, and have come to regard these specific aspects of ability or disability as important prognostic factors in success or failure. Furthermore, empirical work has demonstrated that special phases of ability are revealed by consideration of the separate parts of the tests and their intercorrelations, as well as by the changes in such interrelations coincident with changes in chronological and mental levels. Likewise, the establishment of norms or central tendencies for the separate parts of tests has been found greatly to enhance their value as diagnostic instruments.

Thus it came about that, from the need of a refined, diagnostic scale of mechanical ability for use in vocational and educational advice, this study of the MacQuarrie Test was begun in 1933.[2] From practical work with the MacQuarrie Test, the authors had derived the impression that total scores seemed to correspond to levels of intelligence, although MacQuarrie himself had found the relation to group tests of mental ability to be negligible (less than +.20). Furthermore, it appeared

[1] Study No. 25, Vocational Adjustment Bureau, Inc., New York City. Emily T. Burr, Director.

[2] Since that time two studies utilizing the MacQuarrie Test have been made under the direction of the Vocational Adjustment Bureau, Inc., New York City, but neither was directly concerned with the problem presented herein. Both studies were submitted by students in partial fulfillment for the degree of Master of Arts in the Faculty of Philosophy, Columbia University. French, Luella W.: *Some Factors in the Relation of Intelligence and Mechanical Ability.* Skolnik, Ruth F.: *The Predictive Value of the MacQuarrie Test for Beauticians.*

that when scores fell much below expectations for the level of intelligence, they were most frequently made by abnormal persons with histories revealing general maladjustment, emotional instability, or institutionalization for insanity. These were, nevertheless, subjective impressions coloured possibly by undue attention to unusual scores.

Our problem in this study was two-fold. In the first place, we desired to determine the relationship between the total score of the MacQuarrie Test and a measure of intelligence at various chronological-age levels. In the second place, we wished to determine the extent of relationship between the seven sub-tests of the MacQuarrie Test and their specific relations to the levels of intelligence at these chronological ages.

SUBJECTS

From a group of four hundred subjects, selected mainly from the New York City public schools, supplemented by cases from the Vocational Adjustment Bureau and a group of college students, all cases of emotional instability, glandular imbalance, general poor health, feeble-mindedness, and language handicap were eliminated. The three hundred remaining subjects, of whom approximately two-thirds were female,[1] were distributed as shown in Table I.

TABLE I.—DISTRIBUTION OF SUBJECTS

							Adult	Total
Chronological age	14	15	16	17	18	19	20–28	
Number of subjects	55	34	41	52	48	15	55	300
Vocabulary median (converted to age)	14	14	16	17	18	18–19	18 .9	

In all groups, except the fifteen- and nineteen-year groups, the distribution of mental ages, as determined by vocabulary, very closely approximated the normal curve.

The correlations reported in Tables II and III are all rank-order correlations, computed by means of Spearman's formula.

As a measure of intelligence, the authors have used the new Terman vocabulary (a shorter form of the standard Stanford-Binet vocabulary), which has a range from six years to very-superior adult level and the

[1] In several studies in which the means and standard deviations for the sexes are reported separately, they are very nearly the same.

results were checked by another standardized word list. This was selected as the most practical measure of intelligence available, since time for its administration is relatively short, while the correlation of this vocabulary rating and the rating on the entire Binet scale is very high.

The MacQuarrie Test for Mechanical Ability may be described as a paper-and-pencil scale composed of seven subtests, as follows: (1) Tracing, in which the subject is to draw a continuous pencil line through an irregular series of small spaces without touching the boundaries of the spaces; (2) Tapping, in which the subject is to make dots as quickly as possible; (3) Dotting, in which the subject is to place a single dot in each of a series of small circles; (4) Copying, in which the subject is to reproduce four-line angular figures in respect to length of line and size of angles; (5) Location, in which the subject is to place points in small squares in homologous positions to given points in a large square; (6) Block Counting, in which the subject is to determine the number of blocks touching certain ones of a pictured pile of blocks, all of equal size; (7) Pursuit, in which the subject is to follow, visually, a curving line through a line maze.[1]

The new Terman vocabulary and the standardized word list were administered to each subject individually by a trained psychologist. The MacQuarrie Test was administered in accordance with the author's directions. In no instance were the vocabulary and MacQuarrie administrations separated by an interval of more than four days, while the average interval was less than forty-eight hours.

The first problem with which the authors were concerned was the relationship between mechanical ability and intelligence as indicated by total score on the MacQuarrie Test and the new Terman vocabulary test. While MacQuarrie reported the relationship between his total score and intelligence to be negligible, we have not been able to confirm his results.

The calculation of the coefficient of correlation by the product-moment method, using the entire group of three hundred subjects, showed a correlation of $.62 \pm .02$, indicating a significant positive relation between level of intelligence and mechanical ability as measured by the MacQuarrie Test.

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[1] MacQuarrie reports reliability of separate parts as follows: 1. .80; 2. .85; 3. .74; 4. .86; 5. .72; 6. .80; 7. .76. Reliability of entire scale is reported .90 with each of three groups of subjects. Cf. MacQuarrie, T. W.: "A Mechanical Ability Test." *Journal of Personnel Research*, Vol. V, 1927, pp. 329–337.

Further study of this relationship in the fourteen-year, seventeen-year, and adult groups revealed that the relationship between the MacQuarrie total score and levels of intelligence increases with increases in age within those limits. Data for these respective groups, treated by the rank-difference formula, showed: At the fourteen-year level a correlation of $+.45 \pm .08$; at the seventeen-year level $+.56 \pm .07$; and at the adult level $+.74 \pm .04$. It is evident, therefore, that the older the group of subjects, the greater is the degree of correlation between the level of intelligence, as measured by the new Terman vocabulary, and mechanical ability, as demonstrated on the MacQuarrie Test from 14 CA up to some undetermined point in the twenties.

TABLE II.—CORRELATION OF MACQUARRIE SUBTESTS WITH INTELLIGENCE[1]

CA	14-year	17-year	Adult (20–28 years)
Test 1 with vocabulary level	$.38 \pm .08$	$.16 \pm .10$	$.55 \pm .06$
Test 2 with vocabulary level	$.07 \pm .09$	$.36 \pm .08$	$.52 \pm .07$
Test 3 with vocabulary level	$.28 \pm .09$	$.47 \pm .08$	$.64 \pm .06$
Test 4 with vocabulary level	$.32 \pm .09$	$.48 \pm .08$	$.51 \pm .07$
Test 5 with vocabulary level	$.36 \pm .08$	$.49 \pm .07$	$.75 \pm .04$
Test 6 with vocabulary level	$.25 \pm .09$	$.41 \pm .08$	$.59 \pm .06$
Test 7 with vocabulary level	$.37 \pm .08$	$.49 \pm .07$	$.56 \pm .06$

[1] These correlations are rank-order correlations, computed by the Spearman formula.

With respect to the correlation of each of the seven subtests of the MacQuarrie Test with the general level of intelligence, the authors found that, just as in the preceding problem, with fourteen-year, seventeen-year, and adult groups, the coefficients of correlation grew higher as older groups were analyzed. The results are set fourth in Table II.

With the single exception of Test one, on which the seventeen-year group correlation fell below that of the fourteen-year group, each individual test showed a steadily increasing relationship with level of intelligence in each of the three successive age groups used. Although the significance of the coefficients of correlation was practically negligible at the fourteen-year level, there was evidence of a valid relationship between the level of intelligence and scores on each of the seven MacQuarrie subtests at the adult level.

The authors were finally concerned with the interrelationships of the seven MacQuarrie subtests, since they believed that such relationships should be analyzed before norms or central tendencies could be established for the separate tests. For purposes of immediate comparison, the rank-difference technique was again used with the three chronological age groups. The results are set forth in Table III.

TABLE III.—INTERCORRELATIONS OF MACQUARRIE SUBTESTS AT DIFFERENT AGE LEVELS[1]

CA	14	17	Adult (20–28 years)
Test 1 with 2	.19 ± .09	.47 ± .08	.50 ± .07
with 3	.63 ± .06	.43 ± .08	.65 ± .06
with 4	.54 ± .07	.35 ± .08	.51 ± .07
with 5	.26 ± .09	.26 ± .09	.57 ± .06
with 6	.30 ± .09	.25 ± .09	.72 ± .05
with 7	.43 ± .08	.46 ± .08	.63 ± .06
Test 2 with 3	.26 ± .09	.68 ± .05	.70 ± .05
with 4	.19 ± .09	.44 ± .08	.47 ± .07
with 5	.31 ± .09	.32 ± .09	.55 ± .06
with 6	.10 ± .09	.55 ± .07	.58 ± .06
with 7	.11 ± .09	.52 ± .07	.45 ± .08
Test 3 with 4	.28 ± .09	.66 ± .06	.55 ± .06
with 5	.15 ± .09	.43 ± .08	.60 ± .06
with 6	.16 ± .09	.51 ± .07	.59 ± .06
with 7	.28 ± .09	.56 ± .07	.57 ± .06
Test 4 with 5	.62 ± .06	.61 ± .06	.71 ± .05
with 6	.28 ± .09	.51 ± .07	.73 ± .04
with 7	.49 ± .07	.73 ± .05	.61 ± .06
Test 5 with 6	.34 ± .08	.51 ± .07	.72 ± .05
with 7	.31 ± .09	.61 ± .06	.64 ± .06
Test 6 with 7	.25 ± .09	.54 ± .07	.88 ± .02

[1] These correlations are rank-order correlations computed by the Spearman formula.

Analysis of these data indicates that those correlations which are to be considered significant at the fourteen-year level usually maintain that significance at the seventeen- and twenty-year age levels. Fur-

thermore, those intercorrelations which appear to indicate a negligible degree of positive relationship at the fourteen-year level become significant at the twenty-year chronological age. In certain cases, the significant coefficient of correlation is established in the seventeen-year group.

SUMMARY OF RESULTS

Analysis of the MacQuarrie Test for Mechanical Ability employed with three hundred individuals of ages fourteen through twenty-eight, who were selected mainly from the New York City public schools supplemented by cases from the Vocational Adjustment Bureau for Girls and a group of college students, has demonstrated:

1. The MacQuarrie Test total score has a true positive relationship with the level of intelligence as determined by the new Terman vocabulary (r .62 $\pm$ .02).
2. The correlation between MacQuarrie Test total score and level of intelligence becomes greater with increases in life age between fourteen- and twenty-year groups.
3. Likewise, the correlation between each of the seven MacQuarrie subtests and level of intelligence becomes greater with increases in life age between fourteen- and twenty-year groups.
4. Intercorrelations of the seven MacQuarrie subtests show that all have significant positive relationships in the twenty-year group. Insignificant test interrelationships at year fourteen, become significant at either the seventeen- or twenty-year chronological groupings, while such tests as had a significant relationship at the fourteen-year level tend to maintain this at the seventeen- and twenty-year levels.

While the MacQuarrie Test for Mechanical Ability has been generally considered to have no noteworthy correlation with measures of general intelligence, the authors have substantiated their impressions of a positive relationship which grows greater with increases in life age between the fourteen- and the twenty-year levels. Whatever theoretical hypotheses may be advanced to explain this, the authors believe that it is important in practical work and that due consideration of the relationship should enter into any interpretation of the MacQuarrie total score or of any one of the parts of the test.

PREDICTING HIGH-SCHOOL AND COLLEGE RECORDS FROM ELEMENTARY-SCHOOL TEST DATA[1]

F. J. ADAMS

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In the present study, an attempt will be made to determine the extent to which the products of a nearly minimum testing program during the later elementary-school grades predict the characteristics of the subsequent scholastic records of students.

To fifteen hundred five pupils, low fourth through high sixth grade, the writer administered the National Intelligence Test, Scale *A*, Form *I*, early in 1926; the pupils being divided among the ten white non-Spanish-American public elementary schools of a Texas college town. During the same semester, the Stanford Achievement Test, Form *A*, was given to the two hundred seventy-one pupils of the high sixth grade in these schools.

Some months ago, when data were being gathered, by another investigator, covering the entire secondary-school record and the first-year college achievement of a considerable number of students,[2] the writer became interested in tracing as many of his original elementary-school group as possible. As over five hundred individuals could be definitely established as being within both the earlier and later groups, a study of the data seemed to be of interest.

DATA AVAILABLE

The original testing resulted in: (1) the chronological age data concerning the pupils; (2) the discovered 1926 mental age; (3) the computed intelligence quotient of that time; (4) the grade location, by half grades, of the pupil when the tests were administered; and (5) the elementary school the pupil attended. (6) The age at the time of

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[1] The writer wishes to acknowledge the clerical and statistical services, without which this study would not have been made, of J. M. Singleton and S. D. Ford, whose assistance was made available through the National Youth Administration, and to express appreciation of the kindness of C. C. Mason in allowing the use of data collected in conjunction with his dissertation.

[2] Mason, C. C.: *Predicting College Achievement from High-School Records and Quality of High-School Instruction*, 1935. An unpublished dissertation on file in The Library of The University of Texas.

graduation from high school—*H. S. Grad. Age*, in the tables—was computed for each individual traced, when the semester of his completion of the high school was known. (7) The academic success of the student in high school—*H. S. Aver.*—was calculated on a sigma-score basis, utilizing as the basic distribution only the courses counting for college admission and the entire graduating class of which the student was a member in the high school the student attended. A large majority of the traced students attended high school in the city wherein they were first tested; the high-school records of over a thousand students being employed in the computation of the relative standing of the students traced through this school. (8) The age of the student at the time of entering college, or taking his first college work by correspondence—*Coll. Ent. Age*—was calculated and verified by the registrar's records, being included only when such data were available for consultation. (9) The academic record of the student in college during the freshman year—*Coll. F. Aver.*—was calculated and expressed as a sigma score in relation to that year's freshman class of the college the student attended. (10) The Ohio State University Psychological Test, Form 17, having been administered to about eleven hundred freshmen a year for two years at the college the majority of the students attended, the total aptitude test score of each of the present students taking this test was computed as a sigma score within the year group of which he was a member—*Apt. T. Total.* (11) From this freshman test, the reading test total score was also expressed as a sigma score—*Apt. Read. T.* (12) The total number of semester hours of credit accumulated by the student from his admission to college through 1935 was recorded—*Sem. Hrs.* (13) The fraction of the time, from the student's graduation from high school to the close of 1935, during which he attended college was computed, whenever the collegiate records were available—*Per Cent Coll. Attend.*

For the group taking the Stanford Achievement Test, five added items of data were employed; (*a*) the student's educational age, as computed from the test norms; (*b*) the achievement age for the total arithmetic score; (*c*) the achievement age for the total reading score; (*d*) sigma scores for the chronological ages of the members of the group, placed in inverse order, were added to the sigma scores for the educational ages, resulting in a combination indication of youngness and scholarship; and (*e*) a combination of intelligence-quotient sigma scores and those for educational age resulted in a single expression linking brightness and scholarship.

ASSUMPTIONS AND OTHER WEAKNESSES

Four cautions should be kept in mind with respect to the following data: In the tracing of individuals after a number of years, the persons established, without doubt, represent but a fraction of the total group, and that fraction may not be a typical representation of the total group that a continuous follow-up program might have included; those moving outside the institutions checked, those using an initial and middle name at one institution and a first name and an initial at another, those changing the family name through their marriage or that of a parent, and many others might, if traced, have changed the picture presented here. Again, complete data were not obtained for all the individuals included in the present study, the calculations being founded upon all the cases with respect to which the specific data under consideration were available, thus making for difficulties of comparison of correlation coefficients, as the contributing groups, though composed chiefly of the same individuals, are not always of identical membership. Further, the findings herein presented possess an unknown relationship to kindred data with respect to other groups of individuals, in other localities, with different programs of instruction, not living in a college town. Lastly, an investigation inaugurated at the present time, with these objectives, would utilize more extensive and accurate procedures than those of the present report.

PREDICTION OF HIGH-SCHOOL GRADUATION AND COLLEGE ENTRANCE

To what extent can those later to complete a secondary-school curriculum and those to enter a college be predicted from data obtainable during the later elementary-school years? Table I presents the percentile location within the original grade groups of the mean student traced through high school and the mean student traced into college, with respect to youthfulness in chronological age, mental age, and intelligence quotient. While the average student traced into higher educational levels tends to be found above the mid-point of the original elementary-school group of which he was a member at the time of the testing, and while the percentile placement of the mean student is higher in each respect in the earlier grade level than in the later grade level, a regular modification of percentile placement is not found between successive grade groups.

When the mean chronological ages, at the time of testing, of the students traced into college are compared with the mean ages of the

original grade groups of which they were members, those going to college average nine months younger than the average for their original grade groups; thirteen months for the combined fourth grade, nine months for the fifth grade, and 5.5 months for the sixth grade. In mental age, those traced to college average 6.9 months higher than the average for the original grade groups of which they were members; eight months for the fourth grade, six months for the fifth grade, and 6.5 months for the sixth grade. An average of 11.75 more points of IQ is found for those going to college than the original elementary-school

TABLE I.—PERCENTILE PLACEMENT WITHIN THE ORIGINAL ELEMENTARY-SCHOOL GRADE GROUPS OF STUDENTS GRADUATING FROM HIGH SCHOOL AND THOSE ENTERING COLLEGE

Elementary-school grade groups	Mean percentile placement of traced students						Number of students		
	Chronological youthfulness		Mental age		Intelligence quotient				
	High school graduate	Entering college	High school graduate	Entering college	High school graduate	Entering college	1926 test	High school graduate	Entering college
Low fourth.....	76	76	78	78	83	82	254	44	40
High fourth....	67	70	60	60	72	74	301	101	74
Low fifth.....	67	70	61	62	71	72	207	65	39
High fifth.....	65	70	48	68	69	74	274	124	86
Low sixth.....	67	67	68	75	71	75	209	90	58
High sixth.....	70	67	58	63	63	71	260	158	95

groups averaged at the time of testing; 15.5 points for the fourth grade, 10.4 points for the fifth grade, and 9.8 points for the sixth grade. Viewed in this manner, it would seem that the going-to-college groups, while superior to the average for their original grade groups, are progressively less superior as they pass through the successive elementary-school levels investigated.

PREDICTIONS AT DIFFERENT ELEMENTARY-SCHOOL LEVELS

The question might be asked as to the elementary-school level at which the most accurate predictions may be made concerning the later

scholastic records of the students. Table II presents, for the combined half-grade groups, product-moment correlations between both the chronological ages of the students and their intelligence quotients, as of 1926, and eight later elements of their academic records. In only one instance do the three separate grade correlations follow a regular

TABLE II.—CORRELATIONS BY WHOLE GRADES

	Elementary-school whole grade groups					
	IV		V		VI	
	r	*N*	*r*	*N*	*r*	*N*
Chronological Age, 1926, and						
H. S. Aver.	−.33 ± .06	111	−.17 ± .05	180	−.18 ± .04	223
H. S. Grad. Age	.68 ± .03	113	.69 ± .03	120	.62 ± .03	155
Coll. Ent. Age	.62 ± .04	113	.61 ± .04	120	.63 ± .03	153
Coll. F. Aver.	−.35 ± .06	113	−.09 ± .06	125	−.24 ± .05	151
Per cent Coll. Attend.	−.26 ± .06	110	.05 ± .06	119	−.07 ± .05	153
Sem. Hrs.	−.11 ± .06	110	.08 ± .06	119	−.25 ± .02	153
Apt. T. Total	−.32 ± .07	86	−.24 ± .08	70	−.27 ± .12	29
Apt. Read. T.	−.32 ± .07	86	−.28 ± .07	70	−.50 ± .09	29
Intelligence Quotient, 1926 and						
H. S. Aver.	.46 ± .05	111	.53 ± .04	180	.43 ± .04	223
H. S. Grad. Age	−.49 ± .05	113	−.58 ± .04	120	−.51 ± .04	155
Coll. Ent. Age	−.49 ± .05	113	−.55 ± .04	120	−.51 ± .04	154
Coll. F. Aver.	.49 ± .05	113	.35 ± .05	125	.39 ± .05	149
Per cent Coll. Attend.	.05 ± .06	110	.00 ± .06	119	.14 ± .04	153
Sem. Hrs.	.02 ± .06	110	.27 ± .06	119	.31 ± .05	153
Apt. T. Total	.70 ± .04	86	.63 ± .05	70	.77 ± .05	29
Apt. Read. T.	.66 ± .04	86	.63 ± .05	70	.51 ± .08	29

sequence, the correlations of intelligence quotient and the number of semester hours of college work, but these correlations are low and they are all either of small or of uncertain reliability. Further, when the correlation coefficients for the separate grades are inspected, no grade has a majority of the higher correlations. Thus, it would seem

that, by and large, the three grade levels do not differ greatly as positions from which predictions of later scholastic records can be made.

RELATIONSHIPS WITHIN THE ENTIRE GROUP

With all of the grade groups combined, product-moment correlations were calculated between various pairs of data, some of the seemingly more important relationships being investigated by means of partial coefficients of correlation. These are presented as Table III. It would appear that the intelligence quotients obtained in 1926 possess the greatest agreement with the aptitude test total scores and with the aptitude reading test scores obtained during the freshman college year, with the youthfulness of the students at the time of high-school graduation and at the time of college entrance, and with the academic average in high school. The age of the students at the time of high-school graduation possesses a fairly definite agreement with the age at which they enter college. Moderate agreement would seem to be indicated between the academic average in high school and the level of achievement reached during the freshman year of college, while a fairly definite tendency is found between the secondary-school record and the college freshman aptitude test total.

In the prediction of the relative academic achievement of students during the college freshman year, the following sequence of closeness of agreement would seem to exist, as indicated by the present data; high-school average ($.674 \pm .021$), college freshman aptitude test total ($.573 \pm .034$) and reading test score ($.508 \pm .037$), intelligence quotient as obtained in the elementary school ($.384 \pm .029$), and youthfulness at the time of high-school graduation ($.373 \pm .043$) and at the time of college entrance ($.335 \pm .031$).

STANFORD ACHIEVEMENT TEST AND HIGH-SCHOOL AVERAGE

Of the two hundred seventy-one high sixth-grade students taking the Stanford Achievement Test, one hundred thirty-two were traced through high school. Product-moment correlations between the high-school averages, in sigma scores, of these students and aspects of the test are as follows: High-school average and educational age, as determined by the test, $.55 \pm .04$; and arithmetic total, $.40 \pm .06$; and reading total, $.43 \pm .05$; with a combination of standard deviation scores in chronological age, reversed to give plus scores for young-

ness, and educational age expressed in sigma scores, the high-school average correlated .58 ± .04; and with a combination of intelligence

TABLE III.—CORRELATIONS FOR TOTAL GROUP
(Number of cases)

	r	N	Partial correlations, holding constant—		
				r	N
IQ, 1926, and					
H. S. Grad. Age	−.51 ± .03	388			
H. S. Aver.	.46 ± .02	514	H. S. Grad. Age	.34	388
Coll. Ent. Age	−.49 ± .03	387			
Apt. T. Total	.68 ± .03	185			
Apt. Read. T.	.65 ± .03	185			
Coll. F. Aver.	.38 ± .03	387	H. S. Grad. Age	.28	387
(Coll. F. Aver.)	.....	....	H. S. Aver.	.11	387
Sem. Hrs.	.27 ± .03	382			
Per Cent Coll. Attend.	.02 ± .04	382	H. S. Aver.	−.08	382
(Per Cent Coll. Attend.)	.....	....	Apt. T. Total	−.07	185
H. S. Graduation Age and					
H. S. Aver.	−.38 ± .03	321	IQ, 1926,	−.20	321
Coll. Ent. Age	.85 ± .01	387			
Apt. T. Total	−.37 ± .04	184			
Apt. Read. T.	−.34 ± .04	184			
Coll. F. Aver.	−.30 ± .03	387	H. S. Aver.	−.07	387
H. S. Average and					
Coll. Ent. Age	−.38 ± .03	317	H. S. Grad. Age	−.12	317
(Coll. Ent. Age)	.....	....	IQ, 1926,	−.19	317
Apt. T. Total	.54 ± .04	153			
Apt. Read. T.	.39 ± .06	153	H. S. Grad. Age	.31	153
Coll. F. Aver.	.67 ± .02	319			
Per Cent Coll. Attend.	.20 ± .04	312			
College Enter. Age and					
Apt. T. Total	−.34 ± .04	183			
Apt. Read. T.	−.33 ± .04	183			
Coll. F. Aver.	−.34 ± .03	383	IQ, 1926,	−.19	383
(Coll. F. Aver.)	.....	....	H. S. Aver.	−.13	383
(Coll. F. Aver.)	.....	....	Apt. T. Total	−.19	182
(Coll. F. Aver.)	.....	....	Apt. Read. T.	−.21	182
Per Cent Coll. Attend.	.05 ± .04	380			
Aptitude Test Total and					
Apt. Read. T.	.80 ± .02	183	H. S. Grad. Age	.77	183
Coll. F. Aver.	.57 ± .03	182	IQ, 1926,	.46	182
(Coll. F. Aver.)	.....	....	H. S. Aver.	.34	182
Per Cent Coll. Attend.	.10 ± .05	178	H. S. Aver.	−.01	178
(Per Cent Coll. Attend.)	.....	....	IQ, 1926,	.21	178
Aptitude Reading Test and					
Coll. F. Aver.	.508 ± .037	182			

quotients and educational age, both expressed in sigma scores, the scholastic average in high school correlates .60 ± .04.

DIFFERENCES BETWEEN ELEMENTARY SCHOOLS

As the pupils were distributed among ten elementary schools, it is of interest to observe the extent to which the differences between the pupils of these schools, at the time of the original testing, continue in their later academic records; or the extent to which a somewhat

TABLE IV.—COMPARISON OF ELEMENTARY-SCHOOL GROUPS

	Medians by elementary schools									
	A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*
High IV grade										
CA, 1926	10–11	11–5½	10–9	10–3½	10–9	11–4	10–5	10–9	10–6	10–2
IQ, 1926	95	87	96	109.5	94	97	109	93	97	109
N	51	22	33	24	27	33	43	9	27	32
		etc.								
High VI grade										
CA, 1926	12–6	12–9½	12–6	12–3	12–8	12–8	12–6	13–½	12–9	11–11
IQ, 1926	105	102.5	103	111.5	103	100	109	91	99	114
N	31	22	31	18	11	31	56	8	18	34
H. S. Grad. age	18–7	18–1	18–8	17–9½	18–5	18–1	18–4	18–3	17–11	18–0
N	46	16	33	28	3	17	113	5	25	105
Coll. Ent. Age	19–0	18–4	19–2	18–2	18–9	18–5	18–10	18–7	18–5	18–5
N	46	15	33	28	3	17	110	5	25	105
IQ, 1926, of H. S. Grads	107	103.5	105	113	107	104	113.5	101	104	112
N	65	32	57	51	21	45	144	6	41	119
IQ, 1926, of Coll. Enters	110	109.5	108	120	115	114	114.5	101	104	113
N	46	16	33	30	3	17	117	5	25	105
Apt. T. Total, Sigma Score	−.19	0	−.38	.86	−.87	−.67	−.24	−.81	−.67	−.12
N	23	7	14	11	2	11	51	3	16	47
Apt. Read. T., Sigma Score	−.27	.36	−.36	.63	−.49	−.63	−.26	−1.0	−.49	−.17
N	23	7	14	11	2	11	51	3	16	47
H. S. Aver., Sigma Score	−.18	0	−.18	.27	1.58	−.18	.35	.18	0	.35
N	58	32	51	50	21	42	125	6	37	95
Coll. F. Aver., Sigma Score	−.57	.52	−.73	.1	−.42	−.31	−.1	−.62	−.94	.1
N	46	16	33	30	3	17	114	5	25	105
Semester Hrs	27	66	25.5	42	8	21	39	36	30	51
N	45	15	32	27	3	17	109	5	25	103
Per Cent Coll. Attend	75	71.4	75	71.4	25	66.7	75	71.4	71.4	75
N	45	15	32	27	3	17	109	5	25	103

homogeneous group of high-school and college students is obtained from elementary schools showing fair differences between their averages. Table IV presents the median chronological ages and intelligence quotients for the groups of the separate elementary schools at the time of the 1926 testing, and the median ages and scores for the students traced from these schools into later educational institutions.

Four of the many possible comparisons within these data seem to be of particular interest.

Do the younger and the older age groups of the elementary grades tend to produce younger and older groups at high-school graduation and at college entrance? School *B* possessed the oldest average age in the high fourth grade, in 1926, and the next to the oldest high sixth grade group, but only two of the ten schools had younger high-school graduates and the group from only one school was younger at the time of college entrance. School *J*, on the other hand, possessed the youngest high fourth and high sixth grade groups, its high-school graduation group was the third in youngness, and its group entering college was a bit younger than the average from these schools.

Do the elementary schools of lower intelligence pupils and those of higher intelligence pupils tend to contribute students of about the same intelligence to high school and college? While School *D*, in terms of the median 1926 intelligence quotient of its pupils, ranked first in the high fourth grade, second in the high sixth grade, second among the high-school graduation groups, and first among the college entrance groups; School *J* changed from its second and first ranks in the high fourth and high sixth grades to fifth rank at college entrance. At the lower end, School *H*, next to the lowest in the high fourth grade, is the lowest at each of the other levels.

Do the elementary-school groups of the highest academic average during the college freshman year tend to come from elementary schools different from those of lower college freshman average? School *B*, with the highest academic average for its representatives in the college freshman class, had the oldest average age in the high fourth grade and the next-to-oldest in the high sixth grade, with the lowest average intelligence quotient in the high fourth grade and just below average place in the high sixth grade. Schools *D* and *J*, on the other hand, were the two youngest in both the high fourth and the high sixth grades and the two highest in intelligence quotients at these two levels. School *I*, with the poorest showing during the college freshman year, was fourth youngest in the high fourth grade, third oldest in the high sixth grade, was exceeded by three schools in average intelligence quotient in the high fourth grade and by eight of the ten schools in the high sixth grade.

Are the differences between the separate elementary schools, found at the time of the original testing, related to the amount of college credit earned by their representatives during the period of time

studied? In terms of the median number of semester hours of college credit earned by the elementary-school groups, during the period covered by the present study, the students from School *B* possessed the largest median number of credit hours, a school of relatively old pupils and not over average in terms of their median intelligence quotient. The students from Schools *J* and *D* ranked second and third in median number of semester hours of college credit earned, both schools having pupils of young average age and of relatively high average intelligence quotients at the time of the original testing. School *E* contributed college students whose median number of credit hours was the smallest of the individual school groups, a school of about average chronological age in the high fourth and high sixth grades at the time of testing and not above average in the median intelligence quotients for those grades.

It would seem that factors other than, or in addition to, those of student age and intelligence, at least in a college town, tend to influence the relative size of an elementary school's representation in college, the age of its products at the time of college entrance, their freshman college achievement and the number of credit hours they will accumulate during a period of time.

SUMMARY

Within the limitations of the present study, both as described above and those of a more obvious nature, the following generalizations seem to be justified:

1. The average high-school graduate and the average college freshman tend to come from the chronologically younger half of each elementary-school grade group, from the older half in mental age, and from the higher half in intelligence quotient, such superiority being slightly more marked in the lower grade groups studied than in the upper groups.

2. Grades four, five, and six do not differ greatly as positions from which to predict the later scholastic records of students, in terms of either chronological age or intelligence quotient.

3. Intelligence quotients obtained during the later elementary school period seem to predict best the college freshman aptitude test achievement; then, the youngness of high-school graduation age, youngness of college entrance age, and the relative high-school achievement of students.

4. The relative quality of achievement during the freshman year of college appears best to be predicted from the relative high-school achievement of the students, and then from college freshman aptitude test standing; intelligence quotients obtained during the later elementary-school grades possessing a low positive relation thereto.

5. The combined relative standing of students in the high sixth grade with respect to intelligence quotient and Stanford Achievement Test educational age may be a superior basis for the prediction of relative achievement in high school.

6. Differences between elementary schools in the average chronological age and intelligence quotient of their pupils are not closely duplicated by the differences between the average products of these schools in their later academic records.

7. Little justification would seem to be found, within the present data, for extensive predictions of subsequent academic histories of students from the products of a minimum testing program during the later elementary-school grades.

TO WHAT EXTENT ARE INTELLIGENCE QUOTIENTS INCREASED BY CHILDREN WHO PARTICIPATE IN A RICH VITAL SCHOOL CURRICULUM?

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The State Teachers College at Jersey City, which opened in September, 1929, as a State Normal School offering two three-year curricula, has maintained from its inception a demonstration school staffed by a director and a group of master teachers. The Demonstration School has consisted of six groups: A younger and an older kindergarten group, and one group corresponding to each of the first four grades in the elementary school.

PURPOSE

The administrative organization, the curriculum, and the methods of procedure, all contribute to the purpose of enabling each child to develop himself physically, socially, emotionally, and intellectually. If a vital curriculum—one that considers children's interests and capacities, that requires activity and self-direction on the part of children, and that makes progress at the child's own optimum rate possible—can increase intelligence quotients such as are obtained by the application of the Stanford Revision of the Binet-Simon Intelligence Scale, it seemed that the curriculum of the Demonstration School might have some appreciable effect upon the IQ's of children in attendance over a period of years.

The purpose of this study, therefore, is to ascertain the extent to which the intelligence quotients (S-B) have been increased as the children progressed through the successive groups in the Demonstration School.

SUBJECTS

Records of one hundred forty-one children who have been members of six successive fourth-grade classes from September, 1932, through June, 1937, provide data for this study. All of the children have attended the Demonstration School for at least the fourth grade. The master teachers have remained throughout the six years.

Distribution According to School Years.—There were twenty children in the fourth grade of 1931–1932; twenty-four in the fourth grade of 1932–1933; twenty in the fourth grade of 1933–1934; twenty-three

in the fourth grade of 1934–1935; twenty-four in the fourth grade of 1935–1936; and thirty in the fourth grade of 1936–1937. In this study only those children are considered members of the fourth grade of any given year who completed the work and passed on to the public schools. If a child spent two years in the fourth grade, he has been counted as a member of the second group only.

Respective Periods of Time Spent by Pupils.—The number of years spent in the Demonstration School by the several children varied from six years to one year. Eleven children spent six years; thirty-seven, five years; thirty-two, four years; twenty-three, three years; twenty-two, two years; and sixteen, one year.

Chronological Ages of the Subjects.—The chronological ages of the children ranged from eight years, one month to twelve years, one month, inclusive, with an average CA of nine years, and eight seven-tenths months, at the end of the fourth grade. The chronological ages probably approximate those found in public schools in the residential section of urban population.

Distribution of Intelligence Quotients.—The intelligence quotients, obtained by application of the Stanford Revision of the Binet-Simon Intelligence Scale to one hundred forty-one children, ranged from 89.0 to 134.6, inclusive. The average IQ for the entire group was 109. For one hundred nine of these children there were available from two to five IQ's, earned in as many different grades while in the Demonstration School. For twenty-one children there were five IQ's; for twenty-nine, four IQ's; for twenty-eight, three IQ's; for thirty-one, two IQ's. Thirty-two children were tested only once. For the one hundred forty-one children a total of three hundred ninety-nine IQ's were available. Of these, three hundred forty-eight, or about eighty-seven per cent, were obtained by the writer. Thirty-nine, or 9.8 per cent, were obtained by a colleague who has both special training and several years of experience in administering the test. Five, or 1.2 per cent, were obtained in the spring of 1931 by a young psychologist. Seven, or 1.7 per cent, were obtained in the fall of 1931 by another beginning psychologist. Ninety-seven per cent of the IQ's were obtained by experienced psychologists.

The shortest interval between any two applications of the test to the same child was at least one calendar year, in order to avoid practice effect. The longest interval was twenty-four months. In no case did a child proceed through more than one group without being given a Stanford Binet Test.

COMPARISONS AND FINDINGS

Comparisons have been made for three growth periods. The first comparison is for a growth period of four years, involving fifty-one children who were tested in the first-grade group and in the fourth-grade group; the second comparison covers a three year period, involving seventy-four children who were given intelligence tests in the second-grade group and in the fourth-grade group; and the third comparison is for a two year period, involving eighty-nine children who were tested in the third-grade group and in the fourth-grade group. Because of accelerations and retardations, and because of unequal intervals between successive applications of the intelligence tests, no one group in its entirety is included in the next larger group. At the same time, many children are included in all three of the different comparisons. The comparisons over stated growth periods are presented in the following table.

COMPARISONS OF IQ'S OVER THREE DIFFERENT GROWTH PERIODS

Length of of period	Number	Grades	Mean initial IQ	Mean final IQ	Difference	PE_{diff}	Critical ratio
Four years.....	51	I–IV	112.95	111.42	−1.53	1.36	1.12
Three years....	74	II–IV	108.31	109.79	+1.48	1.18	1.25
Four years.....	89	III–IV	110.39	110.45	+ .06	1.07	.05

In two of the comparisons, the change in IQ is an increase: One increase is .06 of an IQ point, and the other, an increase of 1.48 IQ points. The third comparison shows a decrease of 1.53 IQ points. In none of the comparisons is the critical ratio large enough to indicate a significant change in the numerical value of the IQ.

A fourth comparison was made between the initial and final IQ's of one hundred nine children regardless of the grades in which the respective IQ's were earned. The periods of growth vary, therefore, from approximately one and one-half years to five years. In some cases the final IQ was the result of the second testing; in some, of the third; in some, of the fourth; and in some, of the fifth testing. The average of the initial IQ's for the group of one hundred nine was 110.79; the average of the final IQ's was 110.84. The average increase was .05 of an IQ point—an insignificant change.

SUMMARY

Whatever the number of years over which the growth was studied; whatever the number of cases in the several groups used for comparisons; whatever the grade groups in which the IQ's were obtained; whatever the length of the interval between initial and final testing; in short, whatever the comparison, no significant change in IQ's has been found.

CONCLUSION

The intelligence quotients, as measured by the Stanford Revision of the Binet-Simon Intelligence Scale, of one hundred forty-one children who have completed the fourth grade of the Demonstration School at the State Teachers College, Jersey City, have not been increased by participation in a rich and vital school curriculum.

BOOK REVIEWS

PERCIVAL M. SYMONDS. *Education and the Psychology of Thinking.* New York: McGraw-Hill Book Company, Inc., 1936, pp. XII + 306.

Last year two important books were published which drew attention of psychologists and educators to the rôle of education in the development of the powers of thought, long held up as one of the most important functions of education. Professor Judd's *Education as the Cultivation of the Higher Mental Processes* has been reviewed in a previous issue of this journal.[1] Judd presented evidence to support his contention that emphasis in teaching should be less on facts and more on how to think. Professor Symonds accepted this conclusion and attempted to go one step further. He endeavored to make an analysis of the thinking processes available to teachers, who "should not only be aware of the principles and laws necessary for the solution of a problem, but should also be aware of the mental processes involved . . . "

Symonds has drawn his material chiefly from notes of introspective reports made during a long series of informal discussions with a group of his graduate students, and from a somewhat extensive review of the literature related to the problem, particularly from that of the psychology of the classroom subjects. The book is in three parts: the first, an introductory chapter which states the problem and outlines the procedure of the chapters to follow; the second, nineteen chapters, each devoted to an analysis of a particular process; and the third, six chapters of integration and educational implications.

In the introduction the author criticizes Dewey's five formal steps of a complete act of thought on the grounds that not all thinking takes place in the same kind of problem situation, and that it does not always require the complete act of thought. "The complete act of thought is a mosaic or, better, an organization of very separate abilities." A complete act of thought occurs only when the problem to be solved requires the use of all these separate abilities.

This leads to the analysis of various thought processes, such as learning word meaning, relationships, questions, definition, classification, selective recall, outlining, summarizing, etc. Each chapter opens with sample problems taken from the discussions. These are

[1] February, 1937.

followed by an analysis of the thought process into steps and solution of the problems stated. Applications to the teaching of school subjects follow each analysis. These discussions draw widely upon the literature, and may be criticized in this respect, first, for some notable omissions, such as Wertheimer's work on inference, and second, for a slight tendency to strain the applicability of certain experiments. This is balanced, however, by the citation of many significant studies on the psychology of school subjects, which are usually overlooked by the psychologist.

The analyses of the various thought processes in Part II are integrated in a chapter entitled "An Analysis of Thinking." It might have been more properly entitled "An Analysis of Correct Thinking." The discussion, as indicated above, is analytic and atomistic. The effect of halo, prestige, emotion, set, and such non-rational factors influencing thought, is relegated to a chapter on "Imperfections in Thinking." Errors in inference are classified logically rather than explained psychologically. Many ways in which education can improve thinking, including thinking about conduct, are indicated and will probably be found helpful by teachers. The last two chapters are devoted to testing and research. The last chapter very emphatically refutes certain benighted statements in the "Conclusions and Recommendations of the Investigations of the Social Studies in the Schools" of the American Historical Association relative to the impossibility of reducing education to a quantitative science.

This book should find a wide following among teachers and educators. While some psychologists interested in thinking will find fault with some aspects of the book, they will also find much of vital interest and originality in it. Symonds has come very close to his goal in bringing thinking into the classroom, and this is an important achievement.

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C. S. MYERS. *In the Realm of Mind.* Cambridge, England: Cambridge University Press, 1937, pp. 251.

In this volume Dr. Myers has collected the more important lectures and papers he has given since 1929, most of them within the period 1932–1934. Myers is a great man, and the papers of great men should be cherished. But if the reader expects to find tables of data or detailed information regarding the choice of a career, etc., he will be disap-

pointed. These are papers and lectures dealing in a generous and illuminating way with certain psychological problems; in fact, the subtitle of the volume is Nine Chapters on the Applications and Implications of Psychology. They weigh and interpret the evidence, but knowledge of the evidence is assumed. They also give the author's views on such problems as the Nature of Mind and the Absurdity of any Mind-Body Relation. Bearing these limitations in mind, the reader can gain much from these syntheses. We probably specialize too much and synthesize too little. This book helps to redress the balance. Personally, I liked the following chapters best—The Help of Psychology in the Choice of a Career, The Human Factor in Accidents, a Psychological Regard of Medical Education, and Psychological Conceptions in other Sciences—but other readers may not agree with my selection. All are good and we are glad to see them collected in a single volume.

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L. A. AVERILL. *Adolescence: A Study in the Teen Years.* Boston: Houghton Mifflin Co., 1936, pp. X + 496.

In the preface it is indicated that this book deals with the psychology of adolescence; also one finds that "the author ventures to hope that *Adolescence* may be a real contribution to the growing material dealing with this life period." That it is a psychology of adolescence is dubious; concerning its being a "real contribution" there can be no doubt. It isn't.

Supporting evidence for this evaluation is not difficult to find. The *content* of the book offers nothing new. In fact the available wealth of published material concerning adolescence is scarcely touched. In reading one feels that the author has poorly integrated with his own experience our present data on the adolescent period. One can find many statements given rather categorically which are doubtful half-truths. In this connection it is impossible to forego quoting the following passage from page 63: "Brain tracts and brain areas that have remained 'unripe' and dormant, and in a condition perhaps not altogether unlike the detachment of cortical areas in the state of aphasia, begin to feel the awakening stimulus of the surging blood as it courses through and over them, and are aroused to nascent activity. The extent of this arousal of new cerebral tracts is little

short of marvelous during pubescence." That anyone, purporting to be a psychologist in the present day, could write these sentences in all apparent seriousness, is itself the acme of marvel.

The *organization* also gives support to the original evaluation. Chapter Three and Chapters Seven and Eight are all concerned with parent-adolescent relations. Why this important subject should be treated in separated chapters, with almost inevitable redundancy, is inexplicable. In Chapter Nine on "The School and the Adolescent" the emphasis is almost entirely on organization and administration of the high school to care for individual differences particularly in intelligence. Similarly, Chapter Thirteen on community organization, has little to do with adolescent psychology. Why a chapter on "Crime and Delinquency" should separate chapters on "Satisfiers, Annoyers, and Maturation" and "Adolescent Interests" is very hard to understand. In short, while the author may have reasons for every chapter and for the chapter sequences, these are not evident to the reader.

The strongest element of the book is its point-of-view. Expressed in the author's words it is "that the case method is the most promising of all techniques for investigating human behavior at any level and in any relationship." This is good. But the author fails to follow his own dictum consistently. Each chapter is introduced by several brief case studies written by students. These are interesting but in no way are they integrated with the chapter text. Illustrative cases are frequently given in the text and these have greater pertinence than those at the beginning of chapters. The text discussion does not, however, give evidence of a real clinical point of view which might be expected from the evident lip-service to the "case method."

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C. M. Louttit. *Clinical Psychology.* New York: Harper & Brothers, 1936, pp. 695.

Clinical psychology is a growing field. If following Cattel's early way of looking at the whole field of psychology, clinical psychology is perceived of as being concerned with what clinical psychologists do, then it is concerned with a large variety of activities and interests calling for the application of many different methods of study and

methods of treatment. The general approaches used by people who call themselves clinical psychologists range all the way from ritualistic mental testing naively interpreted to very integrated approaches which clearly indicate a realization that the psychoclinician, to do an adequate job, must necessarily be somewhat familiar with such fields as medicine, education, sociology, and anthropology and to be able to work with specialists who represent these fields. Because of this wide range of interests, because of large differences in actual practices of clinicians, and also because of the increasing improvement in the field of clinical psychology, there has been a crying need for a book that would comprehensively select from the many fragmentary contributions and sources a body of knowledge and systematically organize it. Louttit's book represents an attempt to satisfy this need. However, the author has seen fit to limit the content of his book to a consideration of what he calls the "behavioral" problems of children. Strictly speaking, then, this book is not so much a book on clinical psychology as it is a book on child guidance psychology. In its ambition and general purposes it reminds the reviewer more of Kanner's *Child Psychiatry* than of any book written in the field of psychology. Since the author so limits his book it seems justifiable to evaluate the content of his book in terms of the purposes he himself sets.

If clinical psychology is conceived of as the application of psychometrics in the study and treatment of all human problems of all ages and of all social levels, one type of content is to be expected. If, on the other hand, it is limited to a consideration of behavior problems of children, then another type of content is implied. What do we find in Louttit's book?

We find a volume of nearly seven hundred pages with the content divided into four large parts. Part One is concerned with methods. In the other three parts are categorized all children's problems in accordance with Louttit's classification of them. His three-fold classification of children's problems are: Problems Correlated With Abilities, Primary Behavior Problems, and Problems Correlated With Organic Disabilities. Most space is devoted to primary behavior problems wherein are included: Conduct problems, juvenile delinquency, speech defects, personality problems, and psychoneuroses and psychoses. The least space is given to problems correlated with organic disabilities. Problems of mental deficiency and school retardation are fairly comprehensively treated under the caption "Problems Correlated With Abilities."

In his introductory chapter the author very concisely orients the reader to the relationship of clinical psychology to other mental hygiene knowledge in theory and practice, and to the interdependent nature of psychoclinical work—a dependence that often calls for services from other agencies such as foster homes and social agencies—for carrying out certain aspects of the work. Considering the nature of the volume and the need for brevity the chapter on "Anamnesis and Examination" is fairly well done. The relevant material is presented in almost outline form, but the more important aspects of the physical, psychological, and social examinations are adequately enough described. The other chapter on methods is limited to the consideration of psychometrics. Considered in this chapter are the 1916 revision of the Stanford-Binet, Porteus maze test, discussions of the more frequently used performance tests, group intelligence tests and educational tests, and personality and conduct tests. The Rorschach test is not at all mentioned in spite of the fact that in the last few years it has played an active rôle in clinical contributions. The work of Kurt Lewin and contributors who have been influenced by Lewin's work on experimental approaches to personality problems remains unmentioned. The process of interviewing which is significant in practically all clinical work is hardly mentioned, nor is play technique discussed at all. That is to say, the contextual setting given the book in the author's chapter on methods strikes the reviewer as being relatively insufficient for the problems that he considers later in the book.

Students of clinical psychology will be very much indebted to Louttit for the comprehensive and fine summary of the many clinical studies on very specific problems which he covers particularly well in his treatment of primary behavior problems. Here, for example, the student can find excellent summaries of all the work that has been done on feeding problems, sleep problems, nervous habits in general, temper, and other specific behavior problems. The one criticism, perhaps, that can be made on even this well done aspect of the volume is that the more psychodynamic features when mentioned are not very comprehensively considered. His loyalty to the reactional biography of Kantor should not make it impossible for him to realize the clinical significance of Kurt Lewin and his students or the contributions of the investigators of the Rorschach method.

In spite of the aforementioned limitations, however, students of clinical psychology can profit much by a reading of this book. Certainly this book should be a particular boon to campus psycholo-

gists who have to teach clinical psychology more than they practice it. All in all the book can definitely be considered a significant contribution to the field.

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F. W. THOMAS and A. R. LANG. *Principles of Modern Education.* Boston: Houghton Mifflin, 1937, pp. XV + 340.

As one of the Riverside Texts in Education, this book has an introduction by the greatest editor of educational works since W. T. Harris of the famous International Education Series. I refer to Ellwood P. Cubberley, who manages to compress into a couple of pages of introduction more sound common sense than one can find in a score of volumes of Progressive writings.

Thomas and Lang, despite the fact that they are Californians, also manage to keep their feet on solid ground. They compensate for their sober treatment by giving, as references at the end of each chapter, the most lively and radical writings they could discover. The style is simple and clear and if one feels somewhat dissatisfied with their lack of evangelical fervour, one can put it down to the fact that the authors are "administrative philosophers." They are simply reasonably cautious.

Lord Horder in regard to medicine said that progress was slow; we need not be frightened lest some great discovery were made while we slept; "Science, like Nature, never proceeds by leaps." And so these disciples of Omar Khayam think about education. Changes are taking place, but they must of necessity be slow. Dare the school make a new social order? It dares, but cannot, except over a long period of time. These things the writers seem to have kept in mind.

The next deals with the customary topics. Its greatest weakness lies in the exercises and tests which follow each chapter. I trust the authors know the answers, for I don't. Otherwise the text is an excellent one for undergraduates and can be confidently recommended.

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